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ENVIRONMENTAL ASSESSMENT BOARD

VOLUME: XVIII

DATE: Monday, June 27th, 1988

BEFORE: M.I. JEFFERY, Q.C., Chairman
E. MARTEL, Member
A. KOVEN, Member

JUL 6 1988

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EA-87-02

HEARING ON THE PROPOSAL BY THE MINISTRY OF NATURAL RESOURCES FOR A CLASS ENVIRONMENTAL ASSESSMENT FOR TIMBER MANAGEMENT ON CROWN LANDS IN ONTARIO

IN THE MATTER of the Environmental Assessment Act, R.S.O. 1980, c.140;

- and -

IN THE MATTER of the Class Environmental Assessment for Timber Management on Crown Lands in Ontario;

- and -

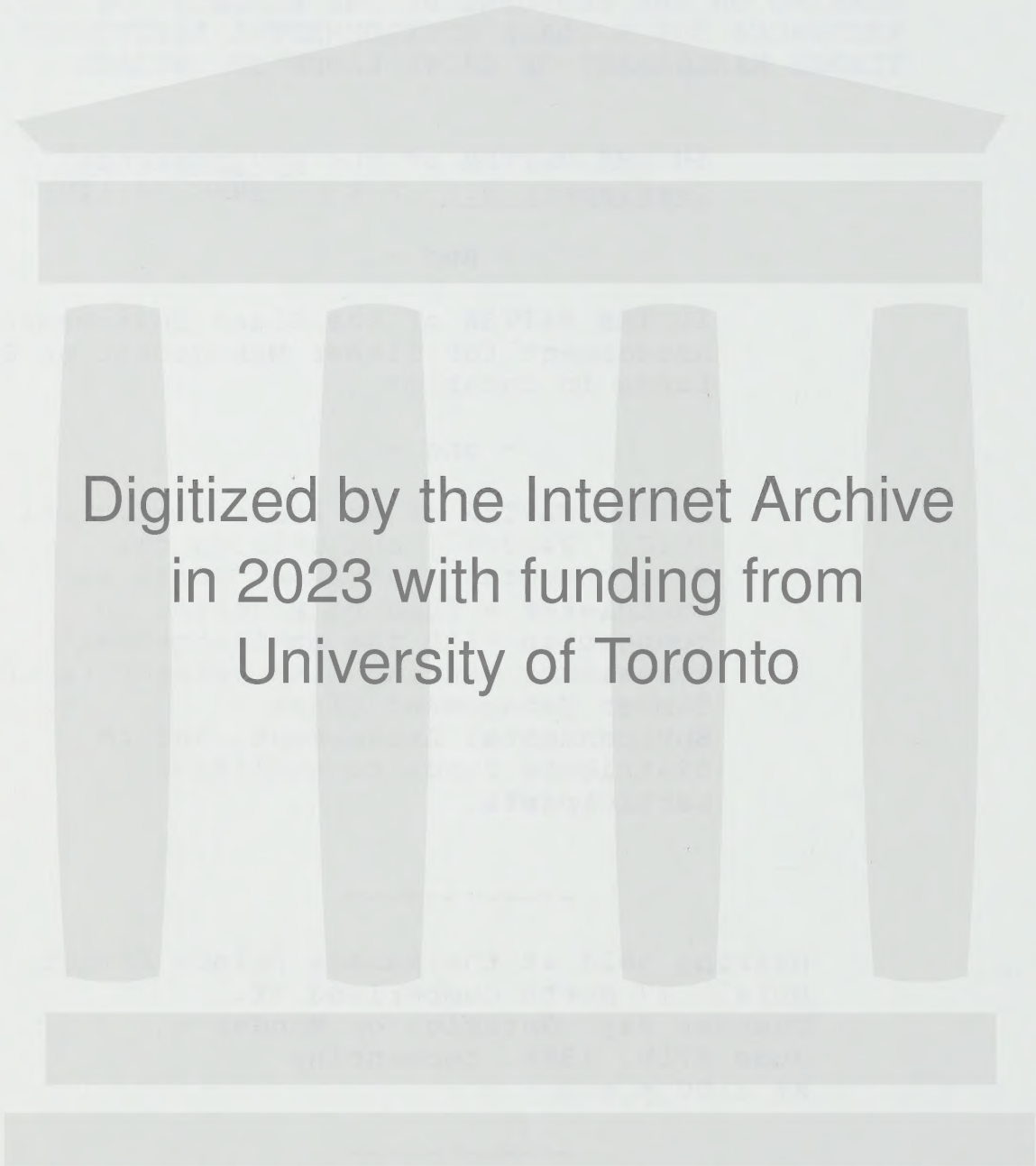
IN THE MATTER of an Order-in-Council (O.C. 2449/87) authorizing the Environmental Assessment Board to administer a funding program, in connection with the environmental assessment hearing with respect to the Timber Management Class Environmental Assessment, and to distribute funds to qualified participants.

Hearing held at the Ramada Prince Arthur Hotel, 17 North Cumberland St. Thunder Bay, Ontario, on Monday June 27th, 1988, commencing at 1:00 p.m.

VOLUME XVIII

BEFORE:

MR. MICHAEL I. JEFFERY, Q.C.	Chairman
MR. ELIE MARTEL	Member
MRS. ANNE KOVEN	Member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A P P E A R A N C E S

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MR. B. CAMPBELL) MS. J. SEABORN)	MINISTRY OF ENVIRONMENT
MR. R. TUER) MR. R. COSMAN) MS. E. CRONK) MR. P.R. CASSIDY)	ONTARIO FOREST INDUSTRY ASSOCIATION and ONTARIO LUMBER MANUFACTURING ASSOCIATION
MR. J. WILLIAMS	ONTARIO FEDERATION OF ANGLERS & HUNTERS
MR. D. HUNTER	NISHNAWBE-ASKI NATION and WINDIGO TRIBAL COUNCIL
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MR. L. GREENSPOON) MS. B. LLOYD)	NORTHWATCH

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I N D E X O F P R O C E E D I N G S

I N D E X O F E X H I B I T S

---Upon commencing at 1:00 p.m.

THE CHAIRMAN: Good afternoon, ladies and gentlemen. Please be seated.

Ladies and gentlemen, just before we commence today, I wanted to mention two things. Firstly, the Environmental Assessment Board has now completed its Citizens' Guide. We have arranged to have copies shipped up here; unfortunately, they have not yet arrived, they will in the next day or so.

This document is a little guide in both French and English which outlines the Environmental Assessment Board's process and I think would be very helpful to those who are unfamiliar with the Board's type of proceeding. It is going to be distributed free of charge to members of the public and counsel and parties to the various proceedings and you will be able to obtain copies from Mr. Mander, of those of you who are at the hearing, and I will leave some copies on his desk so that you can see it. The remainder of them should arrive, as I say, tomorrow or the next day.

The second thing I just wanted to remind you of is that I have to be back in Toronto tomorrow evening and, therefore, we will be sitting tomorrow until approximately 2:30 at the latest. I am suggesting tomorrow, however, we start at 8:30, and

then the following morning I will not return here until, I believe, 10:30 and I am suggesting that we could start, if that is all right, at 11:30 Wednesday morning and we will probably sit a little bit later on Wednesday to try and make up a little bit of the time.

Very well. Unless there is anything of a preliminary nature, we can commence.

Mr. Freidin, are you ready to go with the next panel?

MR. FREIDIN: If I might start, Mr. Chairman, by filing a copy of the witness statement for Panel No. 3. (handed)

THE CHAIRMAN: Thank you. The witness statement for Panel No. 3 will be admitted as Exhibit No. 78.

---EXHIBIT NO. 78: Witness statement for Panel No. 3.

THE CHAIRMAN: And you are aware of the Board's previous directive with respect to qualifying witnesses, Mr. Freidin. I take it there is a CV in there?

MR. FREIDIN: There is a CV in there. I have taken that into account. Ms. Blastorah is going to qualify Mr. Osborn. The qualification of Dr. Osborn is going to be perhaps somewhat more lengthy than you might have anticipated, but it is because during the

qualification evidence he will be describing subject matters of a technical nature which, in fact, will be discussed and must be understood to follow the evidence.

THE CHAIRMAN: Just hold on a second. We did this with Mr. Armson last time as well. Has everybody read the CV with respect to this next witness?

Mr. Castrilli, have you had an opportunity to read the CV?

MR. CASTRILLI: (nodding).

THE CHAIRMAN: And is there any challenge to this person's qualifications?

Mr. Tuer?

MR. TUER: Not by me, Mr. Chairman.

THE CHAIRMAN: Is Mr. Williams there?

MR. TUER: He won't be here this week.

THE CHAIRMAN: Well, Mr. Freidin, I think the Board is going to allow you about five minutes to just briefly review Dr. Osborn's qualifications. There is no challenge to that, the Board has read the qualifications and let the Board know in what fields you want him qualified and we will accommodate you without having to go through it in detail.

MR. FREIDIN: I would like to have a

moment then to speak to Ms. Blastorah then after I do my next filing.

THE CHAIRMAN: Okay.

MR. FREIDIN: The next document I would like to file is a letter dated May the 3rd, 1988. It is a letter from Kathleen Murphy to the parties to this ation -- or this case. Attached to the letter is a document entitled Description of Forest Resources Inventory (FRI). It is a document which in fact forms part of Exhibit 5A but, because it deals with the description of the forest resources inventory, I am going to file it along with this letter.

It was sent out with this letter and it will be easier for the Board to refer to it rather than going back to Exhibit 5A, and if you want to make the cross reference, the document Description of Forest Resources Inventory begins at page 21 of Exhibit 5A. (handed)

THE CHAIRMAN: Thank you. This will be Exhibit No. 79.

---EXHIBIT NO. 79: Letter dated May 3, 1988 from Ms. Catharine Blastorah to all parties.

MR. FREIDIN: You will note, Mr. Chairman, that in the text of that letter it refers to various changes which have been made to the

Environmental Assessment Document in relation to the topic of forest resources inventory. Those are items 1, 2 and 3. In fact the attachment which I described, beginning at page 3 of that document, is in fact the replacement referred to in Item No. 1.

You will also note that in the postscript there is a list of a number of changes to some of the documents which are found in Exhibit No. 3. We will probably referring to those as we go through those documents, but they are listed there.

I will be providing the Board, after the first break with copies of the document with those amendments noted on them.

THE CHAIRMAN: Thank you.

MR. FREIDIN: If I could have a moment to consult with Ms. Blastorah, please.

THE CHAIRMAN: (nodding)

---Discussion off the record

MR. FREIDIN: As indicated, Ms. Blastorah is going to qualify Dr. Osborn and will try as best she can to abbreviate that, keeping in mind that she wasn't prepared to abbreviate it.

THE CHAIRMAN: Well, unfortunately, Mr. Freidin, the Board has little sympathy. We are trying everything to expedite this hearing and a while back we

issued the directive that in terms of qualification of witnesses the Board is not going to be led through a lengthy CV line-by-line. We can read it, everybody else can read it and, unless there is a challenge to the credentials of a particular witness, you are going to be limited - and this goes for all parties - to a very brief overview of the witness' qualifications because, in the past, this process has taken up to an hour -- half an hour to an hour for each witness.

We can cut down substantially because we are going to have a lot of witnesses at this hearing and this is one of the ways that the Board will endeavor to shorten these proceedings.

MS. BLASTORAH: Mr. Chairman, I will endeavor to do that and I will hopefully not take any longer than you anticipate.

I will indicate at the outset that I wish to qualify Mr. Osborn as an expert in forest mensuration, whose work includes the areas of the forest resources inventory, the concept of maximum allowable depletion and yield regulation and I will attempt to just have him hit the very minimal highlights of his actual qualifications set out and expand on those to the extent necessary to show his qualifications related to those particular items.

THE CHAIRMAN: Very well.

MS. BLASTORAH: If I could ask Mr. Osborn to step up to the table.

THE CHAIRMAN: Would you come forward, Mr. -- sorry, Dr. Osoborn so we could have you sworn.

MS. BLASTORAH: Dr. Osborn. I apologize I missed referring to my own witness as Dr. Osborn.

JOHN EDWARD OSBORN, Sworn

MS. BLASTORAH: Will the Board please indicate if they have any problem hearing Dr. Osborn and we can adjust the microphone accordingly.

DIRECT EXAMINATION BY MS. BLASTORAH:

Q. Dr. Osborn, I understand that you have three degrees related to your current work: A Bachelor of Science of Forestry, a Master of Forestry and a Ph.D. in Forestry?

A. Correct.

Q. And the last of those degrees was obtained in 1968. And in each of those areas -- or each of those degrees, I understand, your area of specialization was forest management and forest mensuration.

A. Correct.

Q. Could you please explain to the Board what is forest mensuration?

A. Very briefly the measures of the forest. So we have the areas of the different kinds of forest, we have the detailed description of the trees: Their heights, their ages, their diameters, their volumes. We have the aggregate measures of groups of trees, stands of trees: Their kind, their volume. We have some dynamic measures, how they change over time, so we have growth measures of trees as well as growth measures of stands of trees.

Forest mensuration also includes those parameters that make effect of the trees and stands of trees, arrangement of them, the past growth rates, and some other site characteristics. Essentially those measures, particularly timber oriented, pertaining to the forest.

Q. And, Dr. Osborn, what is the major use of the concept or practice of forest mensuration in Ontario?

A. Primarily threefold. The first is a static measurement of what is out there today, a description of the forests of Ontario as of now, static. The second is an estimate of what has happened in the past as an indicator of growth that may be used to help estimate what might be out there tomorrow. And the third is: Forest management is essentially, this

day and age, quantifiable and measurable in terms of its objectives. Forest mensuration, in essence, is the numbers that go with those objectives of forest management.

Q. And I understand that the concepts that will be discussed in this panel and in subsequent panels relating to thoseitems you just described are the forest resources inventory, the concept of maximum allowable depletion relating to growth rates and yield, and operational cruise techniques giving more detailed measures relating to individual trees and particular stands; is that correct?

A. Yes. Essentially all those matters will be covered in details within this panel.

Q. And I understand that we will hear some evidence relating to wood measurement and scaling in Panel 4 in relation to a discussion of wood supply?

A. That is correct.

Q. I don't believe you mentioned in describing your work with regard to forest mensuration any involvement with statistical analysis or statistics. Is that involved in your work?

A. Yes. Inherently in a province this size or in forest management in totality we take a series of samples, we do not measure everything.

To the extent we take a sample you need to understand the design of how the sampling scheme is laid out, you need to understand the errors associated with sampling schemes, you need to understand how those data can be analyzed, so that you do not misunderstand what in fact you have estimated.

Q. And I understand that you had some training in statistics in both your undergraduate and post-graduate work in applied statistics?

A. Correct, it is an inherent piece of forest mensuration.

Q. And that you also had practical experience in relation to both data collection and statistical methods, as well as the practice of forest mensuration both in British Columbia and in Australia and subsequently in your work in Ontario?

A. That is correct.

Q. And the work that you did in British Columbia and Australia, I understand, involved practical field experience?

A. Yes. In both Australia I was a practicing field forester and when I was in British Columbia the research work I was doing there involved considerable field data collection as well as analysis.

Q. And you did join the Ministry --

well, then Department of Lands and Forests in Ontario, I believe it was 18 years ago.

A. Yes.

Q. Notwithstanding your youthful appearance, it has been some time. And the work that you have done in, I believe it was the position forest mensurationist, you commenced with the Ministry?

A. That is correct.

Q. And in your position as forest mensurationist, you have been involved with wood measurement and the relation between volume and weight of wood?

A. That was one of the projects as a forest mensurationist.

Q. And also the measure of complete trees versus logs or tree length and volume tables?

A. And the derivation of tree length volume tables, yes.

Q. And you did work in sampling in the conversion from the measure of tree length to extrapolate -- to a more efficient method, could you explain that very briefly?

A. Yes. As was explained before, in statistics essentially we take a sample, you need to be able to take that sample and extrapolate to the whole.

So we are measuring some of the trees and estimating, therefore, what the total volume of trees was being cut, was being taken. That extrapolation is necessary.

Q. And I understand your work as a forest mensurationist also involved you in management information systems and some work in that area?

A. Yes. Ever since 1968 I have been involved in the information that is necessary behind management.

Q. And you have been, I understand, a lecturer with the University of Toronto Faculty of Forestry?

A. Yes, I taught in two sessions at U. of T.

Q. And after you completed your stint as forest mensurationist, you moved on to the position with the Ministry of Natural Resources in 1975, the position of supervisor of Company Management Planning in the Management Planning Section?

A. Yes.

Q. Could you describe very briefly for the Board what your responsibilities were there and how they will relate to your evidence given here?

A. Three or four instances. The first was, this is '75 to '78. At that time the forest

industry companies were primarily embarking on a series of management plans for their licensed areas. As an obligation, they had to write the management plan.

To the extent they had never done this, the job I had was to explain to forest industry and the local crown forester exactly what was required in those obligations, the procedures, the data required and the manipulation of the data, the yield calculation procedures, so the entire manual and what was involved had to be explained. Part of my job was to be out in the field with the companies and the local district staff as to what that manual was about.

Related to that was a further development of some of the mathematical processes behind that yield regulation and, in addition, we organized workshop/ seminars to help those staff understand what some of these tools and techniques were.

Q. And I understand that part of your work involved participation in the preparation of a report and the collecting of data to determine whether wood supply or how wood supply related to stated demand?

A. Correct, there was a series of analyses done at that time out of main office in management planning that looked at the available wood

supply for different licencees.

Q. And I believe there was also something that came out of that investigation relating to full utilization of what was then called allowable cut and what essentially we will be hearing about is maximum allowable depletion?

A. That is correct.

Q. And that had to do with surplus allowable cut.

A. Yes, that progressed into what happened in my career next which was the development of the forest management agreements and in that forest management agreement process, a new manual was written and in that new manual was incorporated some of the learnings from the late 1970s, like the example you just referred to, the determination of how much a company required and how much appeared to be, therefore, surplus to its requirements. That concept was emburied in some procedures within the forest management agreement manual.

Q. And what was the result of that discovery, if you will or that recognition?

A. Primarily the need to sort of document that in more detail so there was a better understanding of exactly what any particular licensed

area may be able to provide versus what was the demands being placed upon it by the licencee.

Q. And I believe that led to the introduction of the concept of declared surplus?

A. Yes, it was a procedure that was incorporated in the forest management agreement manual.

Q. Okay. And you also had involvement during this position with computerization of the allowable cut calculations?

A. Yes. Because of the time and effort required in explaining and processing for field foresters how yield regulation was done, it behooved us at that time, and this is late 1970s, the very early ages of micro-computers, to introduce that in a computerized environment, which was done.

Q. And you were involved with the introduction in the Ministry of the concept of a geographic information system and you involvement with the development of that system?

A. Yes. As of 1979 and '80 the task I had was to start the information system inherently behind forest management agreements, in the looking at the ways and means of putting that information together in a system, the relatively modern techniques of computerized mapping, which is a piece of, geographic

information systems was introduced.

Q. And in 1982 you moved on in the Ministry to become supervisor of the Department -- or the Ministry of Natural Resources Forest Management Information Section?

A. Correct.

Q. Arising more or less out of the work that you had been been doing; is that a fair statement?

A. Yes.

Q. Or a natural continuation, shall we say. And at the same time, from 1983 to '85, you were the Forestry Resources Group System Co-ordinator and from '84 to '85 you led a project which designed and produced computer software -- some computer software program for use in the initial input of forest resources inventory data?

A. Yes.

Q. I understand. Could you give us a very brief description of your work in your present position, just hit the highlights of your work as supervisor in that department and how that will relate that to what you will be talking about?

A. Okay. The most ovious highlight is each year I am accountable for the completed forest resources inventory data on some 33-, 34,000 square

kilometres. So each and every year the people who work with me and for me kick out the description - and there will be more details of that later in this panel - of forest resources inventory approximation of that part of the province.

In doing that, there is a whole range of duties which again will be described in more detail, but that essentially is the highlight of what my job is about right now.

Q. And I understand that your work involves or involves standards, the establishment in dealing with standards, data compatibility, data processing, decentralization?

A. Yes, inherently in producing that system for primarily field foresters, be they company or crown, it is important in my estimation to ensure those data reach those people who need them, reach it in a form and format that they can understand, and with whatever tools that I can provide them with, to keep those data up to date and manipulate them.

So inherently part of the responsibility ensures that that is to happen.

Q. Dr. Osborn, does the concept of sustained yield enter into your work or has it entered into your work since you have be with the Ministry?

A. Yes, ever since '68 in the position I have had as forest mensurationist and then through in management planning, the objectives of management have be been there the whole time. So the whole idea of what is done -- I'm sorry, what are managers trying to produce in what context, those concepts of management have been behind the work I have done in both forest mensuration and in management planning.

One of the pieces in that forest management objectives is the concept of sustained yield which will be explained in more detail in the panel and the whole history and evolution of that is primarily forest mensurational.

So my background in forest mensuration enables me to understand and comprehend how that is developed over time.

Q. Would I be correct to say that the major application or a major application of forest mensuration in Ontario is providing the background for forest resource management?

A. Yes. Essentially the numbers behind forest management are those of forest mensurationists.

MS. BLASTORAH: Okay. Mr. Chairman, I would ask that Dr. Osborn be qualified as an expert in forest mensuration, working in areas including forest

resources inventory, maximum allowable depletion and yield regulation, as I stated at the outset.

THE CHAIRMAN: Very well. He will be qualified in those areas. Thank you.

MS. BLASTORAH: Thank you.

MR. FREIDIN: Mr. Armson is also a member of this panel, Mr. Chairman. He has already been qualified, so perhaps he can take his seat.

It may become necessary from time to time for Mr. Armson to sort of absent himself to deal with other responsibilities he has as Provincial Forester, but as much as possible, we intend to have all of the members of the panel available throughout all the evidence-in-chief.

THE CHAIRMAN: Very well. Mr. Armson, you are still under oath, so you do not have to be sworn again.

KENNETH A. ARMSON, Recalled

MR. FREIDIN: Mr. Chairman, if I might, before beginning the evidence, I would like to give the Board just a brief outline of what the evidence of this panel is going to deal with.

As you are aware from reviewing the material, this in fact is the first panel that will be giving technical evidence in relation to forest

management and the panel is described as being one which will deal with the basis for wood supply planning. The evidence of this panel is going to be theoretical; it will not, to any great extent, actually provide the Board with actual numbers in relation to the subject matters it is dealing with.

The numbers which get developed as a result of the application of some of this theory will be dealt with by later panels and, most particularly, by Panel No. 4. Again, of which both of the witnesses, Mr. Armson and Dr. Osborn, will be members.

There are five topics which will be addressed by this panel. They are as follows: Sustained yield, paragraphs 8 to 18 of the witness statement; management units, paragraphs 19 to 28 of the witness statement, and I believe after -- I haven't had an opportunity to look at the evidence of Mr. Monzon, but I believe that most of the evidence which is outlined in this witness statement in relation to management units was in fact presented by Mr. Monzon, so I will take a look at that and try to cut out whatever evidence is necessary so we won't be repetitive.

The third item will be the inventory of the forest which is used for timber management, and you

will find that at paragraphs 29 to 84; yield regulation, paragraphs 85 to 117; and the fifth item will be wood flow, paragraphs 118 to 133.

The purpose of the undertaking, Mr. Chairman, as you are aware, is to provide a continuous and predictable supply of wood to Ontario's forest products industry and the Ministry strives to achieve that purpose by practicing sustained yield management, and that is why the first topic that will be described is sustained yield management and Dr. Osborn will be explaining what that is and, perhaps for emphasis, he will be describing what it is not; he will be describing that it is not an even flow of wood year after year to specific mills.

The second item, management units, again, may be repetitive so it will basically be describing where they are, the type they are - we will introduce a map which will actually indicate where the different types are - and, if necessary, add to the evidence of Mr. Monzon in relation to who carries out what activities on these various types of units.

The inventory of the forest will describe that the inventory in fact is done as a two-step process; that the first step is the conducting of a forest resources inventory, the second step being the

supplementing or the obtaining of more detailed information on smaller areas than the area which is the subject of the forest resources inventory where that supplementary information is deemed necessary by the forest manager.

And there will be a discussion of the various forms or methods by which that supplementary information can be obtained. One of them being operational cruising which in fact is referred to, I believe, in the witness statement and will be discussed, I am sure, at some length if not in direct in cross-examination.

I should point out that the evidence will indicate that whether you are looking at the forest resources inventory or whether you are looking at the supplementary information which in fact may provide additional information in relation to that inventory, all of the data is an estimate. The forest resources inventory is not an exact one hundred per cent accurate picture of what is in the forest at any particular point in time and it is not intended to be that.

The fourth topic of yield regulation will describe the methodology used to estimate and regulate the amount of depletion of the forest inventory through timber management -- the practice of timber management.

In a nutshell, it will describe that the Ministry has a methodology to control where depletions occur - and now I am talking primarily of harvest - where depletions occur, how much will occur, and what will be cut; that it is not a matter of licencees being able to go and cut where they want, when they want and as much as they want.

And the two topics which will be sub-components of yield regulation are maximum allowable depletion, there will be description of that particular tool and it is that tool which in fact calculates how much of a particular species is cut within any particular five-year term of the timber management plan.

There will also be the introduction of a computer modelling device or approach which in fact provides the forester with the ability to predict what the future structure of a forest will look like based on various assumptions about what might in fact happen to the forest in the future.

And the last item is the item of wood flow. The purpose for dealing with wood flow is to indicate that, although the Ministry of Natural Resources strives to attain the purpose of the undertaking by practicing sustained yield management on

a management unit basis, it is recognized that there are situations where, for a number of reasons which will be described in the evidence, a particular management unit may not be able to provide to industry, which historically has obtained its wood from that unit, the exact supply that those particular mills require.

And Mr. Armson will be explaining that the Ministry has in place something which allows local shortfalls in wood supply, for example, from a particular management unit, to be addressed through the provision of wood or wood residues to that particular unit which is in shortfall through what is called wood flow.

As I indicated, this particular panel is almost part and parcel of Panel No. 4 but we have split it up to try and work through the concepts necessary to understand Panel 4 in one panel as opposed to combining them.

Just so you have an appreciation of what Panel 4 will deal with, Mr. Chairman, and you will get an idea what I mean by saying that that panel will deal with the numbers and this panel won't: Panel No. 4 will in fact discuss regeneration surveys, it will describe the Forest Production Policy and the

implementation schedule in relation to it. That evidence will involve basically the description of what activities have in fact occurred in the field in an attempt to implement that policy.

There will be a description by Mr. Armson of a study which in fact looked at the success, if I can use that word, of artificial regenerated areas in northern Ontario and there will also be a section of Panel 4 dealing with the long-term wood supply picture for Ontario which again gets into a lot of number crunching, gets into the modelling which is done to predict, or what can be done to attempt to forecast the future based on various assumptions.

I think that's where we are going.

DIRECT EXAMINATION BY MR. FREIDIN:

Q. Dr. Osborn, the purpose of the undertaking is to provide a continuous and predictable supply of wood to Ontario's forest products industry.

In paragraph No. 2 of the witness statement you indicate that to understand what this means that one must consider the dimensions of space, time and of volume.

I would ask: Could you explain what you mean by that comment?

DR. OSBORN: A. Yes. I would like to do

this with reference to four diagrams which are given on pages 62 to 65 and, I believe, Mr. Freidin, there have been some slight modifications to these diagrams which have been distributed.

MR. FREIDIN: Mr. Chairman --

DR. OSBORN: The clarifications are primarily --

MR. FREIDIN: One moment, Dr. Osborn. I didn't distribute those because I am not sure whether they are in the right order, but it is better to have them -- somebody has to direct the Board to which one of these changes you are looking to. (handed)

THE CHAIRMAN: Thank you.

Mr. Freidin, do you want this package to go in as a separate exhibit?

MR. FREIDIN: I am just wondering whether -- what we could do is wait until it is referred to in the evidence and then, if it is page 62, we can just say 62A which is the replacement or something like that. It may be an easier way to follow.

THE CHAIRMAN: All of these documents are in the witness statement; is that correct?

DR. OSBORN: Yes.

THE CHAIRMAN: Okay.

MR. FREIDIN: Q. All right. So, Dr. Osborn, perhaps you could make an effort to advise us when you get to one of these documents which has been changed.

You suggested that this was one of them.

DR. OSBORN: A. In this first four there are some very minor changes which I will illustrate as we go through.

THE CHAIRMAN: Well, these documents really are not the same as the ones in the witness statement; is that correct?

DR. OSBORN: Sir, if I can show you what the differences are in relation to can decide you then whether the difference is real or apparent in a way.

THE CHAIRMAN: Well, I think what I am getting at, Mr. Freidin, is is that we should have on the record, I would suggest, the document upon which you are relying.

If you are going to be relying upon this document, even with the new changes, I think they should be given an appropriate number, either as a package, if you want, or individually. I do not know what would be your preference.

MR. FREIDIN: All right. Why don't we make them exhibits as a package, but during the break

we will take those documents in the order in which they appear in everyone's package and we will identify what page of the witness statement in fact it replaces just so you can follow.

I didn't want to -- I didn't realize that the changes had been made and I didn't think it was going to be done in that fashion, but there they are and we will try to make it understandable in terms of following them.

THE CHAIRMAN: Okay. I think what we will do is we will make this package Exhibit No. 80.

And, Dr. Osborn, when you refer to one of these documents comprising Exhibit No. 80, let's have the reference in Exhibit 78, which is the witness statement for Panel 3, so that there can be a cross-reference.

And I would suggest, for everyone's convenience, that they write on the actual page of Exhibit 80 that cross-reference. I think for the purposes of the record it will be Exhibit 80 documentation upon which you will be relying; is that correct, Mr. Freidin?

MR. FREIDIN: That's correct.

---EXHIBIT NO. 80: Package of documents containing replacements for documents referenced in Exhibit No. 78.

MR. FREIDIN: I am not sure how this is going to turn out with this pole. Let's have a go at it, I guess.

THE CHAIRMAN: Is everybody able to see that?

(No response)

Could the ones who cannot see that because of this pole perhaps move to another table on the right there, please.

MR. FREIDIN: Q. Okay, Dr. Osborn.

DR. OSBORN: A. Continuous/predictable. There has to be some indication of continuous/predictable block. As far as timber supply is concerned, we are primarily talking of volume.

So the axis of importance in this continuous/predictable that we will refer to at length is to be volume, and because it is continuous, we have to take some cognizance of time horizons.

So the other axis in this kind of diagram which will be repeated is over time. It is for a specific area. This also is important, it isn't just management as a motherhood statement, it is for a defined piece of geography.

Q. In the case of timber management,

what is the area that is referred to that that management planning takes place?

A. The management unit, which will be explained later in this particular panel, and you have already had an illustration in Panel No. 1 of management units.

It doesn't have to be the management units. Again, the manager has to decide what piece of geography he or she is talking about when describing the timber supply but, typically, the answer is management units.

This is a diagram, for example, on which there has been a change. The broken line on the volume axis I do not believe is in the original on page 63.

The break in the axis would indicate we have a change in scale. All it says is if you try to put this diagram on one -- the trail on one diagram you would have difficulty because of the magnitude of the scale. All that that simply indicates on the left-hand side is we changed the scale of the volume measurements and you will see why in a moment.

We have to be cognizant of what kind of volume we are talking about. In terms of introducing jargon, the foresters will talk about the growing stock, the capital stock, the entire forest, trees,

volume that's out there at this point in time. So the expression growing stock will be introduced.

In terms of time horizons, the foresters are concerned with primarily three: Cognizance of the past, recognition of the 20-year time horizon on this diagram which has some specific importance in management planning world wide, as well as in Ontario, and the future for foresters is short term. A long-term time horizon is 60, 70 or 80 years.

Q. Why that length of time?

A. Essentially that's typically the length of time it takes trees put into the ground today to reach a stage of maturity whereby they can be cut down. It bears the species, the size, but typically that kind of a time horizon. So we have a very different time horizon from the average manager.

Q. If I just might, before you take that off, Dr. Osborn, you indicated on the time horizon the past. Can you advise why the past is considered in relation to this topic of continuous and predictable supply?

A. Within forest mensuration has typically been found that the past growth rates, what has happened in the past as measured, is a very strong indicator of what is going to happen in the ensuing

future. The past five or ten years' growth of a tree or groups of trees is often a dominant factor affecting the growth for the next five or ten.

There are variables and changes, but that is a very important fact to be aware of, what has happened yesterday as a first approximation of what may happen tomorrow.

Q. Now, also in that document you have broken the 20 years up on the bottom axis into a five-year period and a 20-year period. Is there any particular reason for having chosen those two particular time periods for this diagram?

A. Yes, sir, there is. The 20-year time horizon is typically the management planning time horizon, the management plan is typically written to cover a 20-year period as well as into the future. This is almost international.

Within Ontario, that practice has been done up until very recently with a recognition of looking at more frequently by a five-year interval the changes. You still have the concept of a 20-year short-term horizon, but with the first five years, paying rather special attention to - and as you will see later in the course of the description of sustained yield - which is a five-year review, is an example of

where in Ontario we are trying to pick up watching how those changes take place.

Q. And the volume on the vertical axis, is there a common measure which is used to describe volume when we are talking about timber management?

A. The word -- expression growing stock. The volume that's on that left-hand axis can be given in a variety of ways. We can have gross total volume, that is literally all of the tree and all of the trees - this will be exemplified in more detail when we talk about the forest resources inventory - or we can have typically the amount of the tree which is utilized by forest industry today, which is less than the total.

And there are words for that which we will explain later when we talk about the forest resources inventory. So, again, you have to be cognizant, aware of what volume are we addressing, what volume are we describing.

One other factor on that diagram, that because it has been coloured doesn't show as well as the original in black and white in the hard copy on page 63, that's the fact that the line of the past was solid. The indication that the evidence for that was fairly sound.

The line for the short-term 20-year

period is dotted, inferring that it is somewhat of an uncertain estimate and at page 63 the line for beyond year 20 is even fainter inferring that the further the time horizon, the longer the time horizon, the less certain is the estimate of what may happen tomorrow.

Q. And in terms of that volume, again, is it described -- what are we talking about, cubic metres, do we talk about some other form of volume measurement?

A. Yes. The measurement in Ontario at this point in time happens to be metric so we are talking of cubic metres. In the past in Ontario there were a variety of different factors. At this point in time we just happen to have a metric system. The rumor is that may change.

Just to progress we have to worry about more than just the growing stock that's out there at this point in time, we also have to be aware - and this is the real reason for the break in the scale - we have to really be aware of the growth of the forest. The same sort of diagram, same specific area, let's have another volumetric measure. We've got cubic metres and now we've got growth rate. The analogy of the growing stock is the capital you have got in your bank account, the analogy to your bank account is the interest rate

is the growth. We will come back to the growing stock, growth over and over again, the sustained yield in the FRI and in yield regulation.

Q. Now that particular document is a change to the document which is on page 64; is that right?

A. Yes, sir, it is. There is a break in the volume axis on the left-hand side. The other change in the diagram to page 64 is that the five-year time horizon is shown as a sub-set of the 20-year, whereas the document on page 64 includes the five-year and came before the 20-year.

MR. MARTEL: Would you run that one by me again.

DR. OSBORN: Yes, sir. On page 64 of the original document, the five-year time horizon from today appeared as if it came before or separate from the 20-year.

MR. FREIDIN: Q. Dr. Osborn do you have the pointer that Mr. Armson had here when he gave his evidence. Oh, all right.

So wherever you think it would be helpful you can point that out or use that.

DR. OSBORN: A. We are talking within this modified diagram, this five-year time horizon is

the first five years of the 20-year period. The diagram on page 64 inferred that the five years was not inside the 20-year period.

Q. So it is a correction of the original diagram?

A. Yes, sir.

Q. Perhaps you can proceed with explaining that particular diagram, if you would.

A. This is the diagram that is given on page 65.

Q. I am just wondering -- I am sorry to interrupt you, Dr. Osborn. Could you go back to the previous document?

A. Yes, sir.

Q. Why are we concerned with growth on the bottom line of that particular diagram?

A. Because the definition of sustained yield that is given in the evidence and in fact is given on page 19 of document, submission 78, talks of, in the definition of sustained yield, the growth of the forest being an indicator of the amount that should be cut or depleted. Inherently talking sustained yield, the growth of the forest is important to know because it is the growth that we are trying to harvest year after year.

Theoretically, the forest was in a certain condition, you can take that growth year after year after year and the forest would stay virtually as it was. So the growth is an important factor to have some awareness of.

Q. Thank you.

A. And that leads in sense to the last diagram, which again has a slight correction on what was on 65. Again, the 20-year period did not include the five-year piece whereas the five-year period on this corrected diagram shows the five years in the 20-year time horizon.

In this diagram we have introduced another measure of volume that really is what we are all about. Continuous/predictable supply is very much a process of trying to ensure that the wood goes in through the mill door. The volume that is cut is part of this word depletion.

So we need to be aware of the growing stock of the forest, we need to be aware of the growth of the forest, and we need to be aware of the depletion and theoretically in that definition of sustained yield that is given in paragraph 5 of the original witness statement, it talks of the growth and the depletions being equated to be the same thing year after year

after year, the inference being that the amount that is depleted should equal the growth of the forest.

Typically they do not, but the word depletion embraces four main forms of taking away from the forest, four. The first and the most obvious is really what this enterprise is about and that is cutting the trees in the forest.

But the forest is depleted for three other factors. One of those other factors is fire, a natural disaster. The second other form of depletion is primary biological defoliation, insect depredation causing effects in growth and in mortality.

And the third is that the land base is not necessarily a constant, the land that is available, the area that is available for this specific location. So for this specific location, this specific management unit, it may well be that part of that land base is withdrawn in timber management, or some other purpose.

There is four forms of depletion inherently in that line; that is, the marrying of those depletions and the growth and still keeping that forest growing stock well organized is really what continuous/predictable supply is all about.

For a particular area we have to pay attention to: What volume did we have, what is the

growth on that volume, what are the growth or actual depletions on that volume and how do we keep that harmonious volume to ensure that we will have something to be cut year after year.

Q. I note in that particular document, Dr. Osborn, that if you look at the space between the growth and the depletion line in the left-hand side of the diagram, that at one particular place it gets fairly close, your depletions get fairly close to the growth.

Is there any particular reason for showing them that close?

A. No, there wasn't. It is merely that this is a record - a very hypothetical record in this case - of typically what does happen. You need to track what the depletions and the growth were. There was no particular reason to indicate them getting closer or further apart, but this is not an unusual type of situation.

Q. Okay. If we go to the 20-year period and go into the second column, right below Plan Period, in that particular area it depicts in one location, does it not, where the depletion actually exceeds the growth?

A. Yes, sir, it does.

Q. And would you just point out where that in fact is shown?

A. In the diagram we are talking literally where the brown or the red line, which is the depletion line, exceeds at that point in time, except it is an estimate of tomorrow we are looking at in this particular part of the document, exceeds the growth line.

Q. Is that situation acceptable in timber management?

A. Certainly. For that particular point in time that may well occur, again, remembering continuous/predictable, we are trying to ensure we have wood going into the mills. The depletions, for whatever reason, exceeded the growth line at that time, the growth was depressed at that time for a variety of reasons, at that point in time and, again, this is an estimated part of the diagram.

But the forest is still there, the growing stock still exists, the forest hasn't disappeared. This very simplistic diagram doesn't show what shape that forest is in. At any one point in time the depletions may well exceed the growth and, in fact, evidence presented later will indicate where that is a very sensible thing to do to fulfill the objectives of

management.

Q. Is there any general comment or observation that could be made as to whether there is a time period beyond which the depletions could not exceed the growth without some sort of a re-evaluation?

A. Yes. If, for example, in that first five-year period we were to find the depletions to dramatically exceed the growth - for example, let's say there was a traumatic fire, a very large fire, in fact evidence will be presented later to exemplify that, in those circumstances, rather than go on to try and predict what may happen with those sorts of events, we would go back and we would take a close re-evaluation of what have we got, what are our re-estimates of what may happen.

That particular disasterous fire may cause a re-estimatation of any of these particular lines. And so if there was some large event that upset these predictors, we would certainly go and re-estimate where do we go from here, given that change in circumstances.

Q. And I understand there will be examples of that later in the evidence?

A. Certainly.

Q. The future portion of the diagram

where you have got the dotted lines, how far into the future do those lines go or, I should say, should there be an indication?

A. Yes. The pragmatic answer in management planning is the lines in the future should go at least for what is called a rotation; that is, the length of time it takes for the trees to be age one to the age at which they are cut and we'll come back to that later on.

Typically that is the length of the prediction that is made for a particular area, supply will be looked at for a rotation length. You could argue that one could continue beyond that, and there is no reason why you could not continue beyond that with the very obvious comment that the estimates of what might be 100, 120 and 150 years from today is a little bit difficult to make.

If you just think backwards to when 150 years was from today, that is like being 1830, 1840 and trying to decide then where we are going to be as of 1988.

So to that extent the answer is yes, you can predict that far in excess, but the estimates become increasingly unreliable and, in some ways, not so useful.

Q. And when you referred to rotations being 50, 60 or 70 years into the future, is the rotation age different for different species?

A. Yes, and for different products and on different sites. So there are a variety of factors that give rise to what the rotation either theoretically could be, as well as a management decision in the setting of rotation where managers decide, for a particular product, what the ideal rotation is. If they are trying to grow trees for a certain size and how long it takes to grow them, that seems to be the rotation or the length of time you take in which to grow them.

Q. And could you give me just a brief explanation of how the rotation age might differ based on sites?

A. Yes. There will be more data describing this, exemplifying this actually when we talk about the forest resources inventory, but very typically, the higher the quality of site the faster the growth rate of the trees, irrespective of species, the quicker they will reach their peak and die off.

No different from human races in the world; some of us grow faster, peak earlier and die off quicker. Trees are generally the same; the poorer the

site the slower the growth of the tree, typically the longer the rotation. Again, it depends to some extent on the definition and the choice of how you fix rotation.

Q. Now, the last question I would like to ask you about this particular document, it speaks to predictions regarding the growing stock, the growth rate and the depletion, and could you advise how often over the long period do you make those predictions?

A. We are talking as of today you have an estimate of what is out there, as of today we will estimate what that future scene, scenario may be. We will typically re-estimate in five years' time, at the moment in Ontario, that is typically in the re-planning horizon.

As mentioned earlier, if there is some catastrophy, some change that upsets that prediction, that may well be shortened. At the moment in Ontario, the time horizon is five years which is why this five-year period is inherently contained in the 20 years.

Q. Thank you. Now, Dr. Osborn, could you turn to Document No. 2 which we find on page 66 of the witness statement. That is a document entitled Land Management Options. Could you advise what the

purpose of that document is?

Perhaps, let's just start with one question at a time. What was the purpose of producing this particular document?

A. Primarily to indicate that timber management -- the timber manager looks at his area, her area of management and decides in light of the demands being placed on that area what he or she thinks are the objectives for that area. And there are a range of alternative choices, there may be one or more as a mix. Within that mix, the idea of sustention of the timber supply is one, but not necessarily the only option that is considered.

So in timber management, in terms of objectives, there are a range of alternatives to be considered, and what I wanted to ensure that the Board understood was that sustained yield, which is very much the front end of this panel, isn't the only, although it is the most important particular piece intent.

Q. And could you quickly explain the particular document you prepared?

A. On page 66 you have essentially got the finished product of what really is a sort of series of lead-in diagrams. We have essentially three basic situations which are exemplified in this diagram.

We have land that is productive as far as timber is concerned but there are no trees of commercial value on it; we have got the land, we have got the trees, and we have land that is productive and has got no trees on it.

Those are three basic alternatives that exist in a variety of places in Ontario and they will surfact in the course of the panels in terms of timber management.

Before those we have some strategies, some choices. This diagram really is to illustrate the sort of choices that we have. So the first essentially says we have got land where the trees are at this point in time of no timber commercial value we can convert itto other uses or we can leave it as it is.

The second one is similar, except now we because there was trees on there of some commercial value, we have in that example of the sustention of the wood flow. Again, we have other choices, other alternatives and they do exist and they are practised in Ontario.

The last situation, again, we can convert the land to other uses and this happens and, after depletion we talked about earlier, we can aforest and sustain, which again will be described in the various

panels following this one, or we can leave the area as it is.

The purpose of the diagram was to bring to your attention that there are these range of choices and they are all practised in different parts of Ontario depending on the local circumstances.

Q. Are those particular strategies exclusive of one another?

A. No, not necessarily. They can vary in their timing as to when any of them take place. Some of them may be exclusive.

Q. On a particular management unit, could you have in fact more than one of those particular strategies which are set out in the right-hand column?

A. Yes. Within a management unit the range of choices is the slot, the time the management unit is treated under one of those exclusively. If you don't decide on the entire management unit, sustention is the only way of doing business.

A part of it may well be set aside for a provincial park and a part of it may well be left alone for whatever reason, another part of it may well be because it is bare land aforested. So within the unit there is some variations amongst that set.

Q. And, Dr. Osborn, could you provide just a brief outline at this particular stage of the topics that you are going to be covering in your evidence?

A. On page 67 of the Panel 3 evidence there is a diagram that is virtually the same as this, the only difference being that on page 67 underneath it there are four sets of annotations and they relate to the four numbers. The diagram here is the same diagram just made bigger so its easier to see.

Q. And just before you do that, is there a text in the witness statement which in fact speaks to this particular document?

A. On page 19, paragraph 7 speaks essentially to the predictions and the quantifications of what was required on any particular management unit, what sort of things either must you know or must you have in order to make these predictions of what is to happen on this particular management unit. There are some pieces that you must be aware of and know how to use.

Typically, within that paragraph 7 on page 19 you need to know, as this diagram shows in No. 1: As of today what do we have out there in the forest that we are trying to manage. A greater description of

this will be provided in the third component of this panel when we talk about the forest inventory.

You also need to know -- as evidenced in No. 2: You need to have some sort of prediction tool or methodology whereby you take the estimate of today and project what it might look like tomorrow and that prediction tool will be described at more length in the section when we talk about yield regulation, which is the fourth of the five components of this panel.

The third item on this diagram, which is exemplified by the planning period, is the inference there needs to be a framework, there needs to be some structure in this prediction process, and we will spend some time when we describe management units describing responsibilities and how this planning period fits into that management unit framework, which is the second component of this panel.

The fourth item on the diagram which essentially overlaps from the past across today, there needs to be some way of tracking and aware, recording what has happened in the past in terms of depletions and growth. And as indicated before, we need to have some cognizance of what has happened in the past as a potential help to that predictor tool, but we also need to have that estimate of what happened in the past to

enable us to keep today's estimate up to date and that also will be described in the section on the forest inventory.

In terms of what is going to be spoken to, this diagram essentially synthesizes those first four components of this panel.

Q. And will there be, during the evidence of the forest inventory, references or reference to how in fact the estimate of the forest inventory done through the forest resources inventory can be kept up to date--

A. Yes.

Q. --or current?

A. Yes, there will be.

Q. Now, if I could, Dr. Osborn, refer you to paragraph No. 9 of the witness statement. And in that particular paragraph there is reference to factors which affect the flow of products which can be sustained from a given land area.

You refer in that paragraph to two things which can affect the flow of products. Before you describe those two, could you advise whether in fact that there are other factors which could influence the level and the timing of sustained yield from a given area?

A. Yes. The two that are described essentially are the rotation and the age class structure but, in addition to those two, the other factors that affect how much can I get and at what time horizon and how frequently would be: The species, what kinds of tree have I got out there, it would be some measurement of the site, how productive is the piece of real estate we are managing on. Again, the higher the quality the faster the growth rates the higher the level that can be sustained.

There are some forest mensurational terms of stocking. Stocking really is how many trees have I got per unit area sort of thing; the denser the forest has an impact on growth rates, the more open the forest changes that. So we have some stocking factors which will be described.

We have some -- we need some measures of the size classes of trees, the diameters, as it affects the kind of product they could be used for. So the level of productivity, for example, for a saw mill is very influenced by the number of large trees that we have, given that saw mills cannot process unduly small trees. So the actual size distribution in the forest is important in terms of the level of sustension.

Q. Does age class come into play?

A. Yes, sir, it does.

Q. And maybe I am jumping a little bit further ahead, are you going to be dealing with that later in your evidence?

A. Yes, I will be.

Q. All right. Well, perhaps you can just briefly describe how that comes into play?

A. Okay. Before I do that though I would like to introduce as one other factor because the piece on age class is quite lengthy and quite involved.

There is one other factor that I would like to define before I get into the age class. I have already used the expression, I want to ensure that this particular word rotation is understood because there are some numerics with this that will help in the age class description.

Again, the format of the diagram is much like the first one. We have the volume over, in this case we have age, and this is given on page 68 of the evidence. In this diagram, in essence, we have as the trees become older, either tree or trees, the volume of a tree or the trees increases in size up to a maximum and then the tree or the trees will die and fall apart. Natural biological type of curve.

For whatever the management objective

reasons, the manager will decide on a rotation; that is, the number of years from start until the trees get harvested, cut. It is the age at which the manager decides the trees are mature for that objective: Pulp mill, saw mill, veneer mill, and the actual age will vary with species, vary with product. It is not necessarily the age at which the tree or the trees are the maximum size or volume, and we will come back to this factor later on.

But I wanted to use this diagram to exemplify that for the ensuing set of diagrams to do with age classes, we have chosen 80 years as the rotation for the examples that we will describe, and at 80 years, if this were to be spruce trees, you would typically get 125 cubic metres per hectare.

Q. Perhaps I could just interrupt, Dr. Osborn. This is a document which has been changed?

A. Yes, thank you.

Q. So we should have the document which is similar to the overhead.

A. What we have added to the document from the original were the values on the left-hand side, the values of 125 cubic metres per hectare.

Q. And what is the significance of the letters underneath 125 cubic metres?

A. Primarily to remind me from where I got the 125 but, in all honesty, the SB stands for black spruce, and there will be a greater detailed of explanation of this shorthand when we talk about forest inventory.

SB for black spruce, SC-2 is site class 2, so in the tables where you look this value up, you look at the table for spruce, you look at the table for site class 2. And, in this particular example, I have divided to choose a level in the forest where trees were at a level that is 65 per cent stock.

It means on a hectare, ten hectares, approximately 65 per cent of the area is occupied with these black spruce trees growing at a rate equivalent to site class 2.

This was derived from a set of tables that we will see later when we describe the forest resources inventory, just so that there was a recognition of where these arithmetic values actually came from.

Q. Now, before you go on to the documents - and there is quite a number of them in Document No. 5 - could you advise: In reference to paragraph No. 9 you listed for me a number of factors which could have an influence on the level and the

timing of sustained yield or sustained supply.

Was there any particular reason that you referred to only two of them in paragraph No. 9; the two being: The structure of the forest when management is introduced, and the second one being rotation age or the age when trees will be cut?

A. These two factors were selected because they are two factors over which forest managers can do something.

Just to step aside for the moment, the others that I spoke about: the species, the site, the stocking, may well be a given; when you walk out there you walk into whatever species are there, whatever sites are there. The age class distribution and the rotation are two factors that we can manipulate productively. The rotation is a management decision, our choice.

The age class structure is a given when we walk into it, but we can change it over time and, in fact, in order to sustain what is out there, it is the manipulation of that age class structure that is our long-term goal and set of practices. We are trying in the objectives to do two things: Put the wood in the mill door, change the age class structure so that we can do that forever.

MR. MARTEL: But you can change the other two; can you not, the species?

DR. OSBORN: Yes, sir, if we start with bare land age one.

MR. MARTEL: I see.

DR. OSBORN: But given I walk into a 68-year-old stand without cutting down and getting rid of existing ones I can't get that automatically, but fair comment, if I start with bare land very much so, I have that choice.

MR. MARTEL: But these are the significant two that you start with primarily?

DR. OSBORN: Yes. If I walk into the area of the undertaking right now, for the most part, Mr. Martel, I walk into an existing forest, not bare land. So these were the two why I selected to manipulate.

MR. FREIDIN: Q. But in terms of once you do go into that land and through a management decision decide that it is time to harvest one of those areas, in some cases, am I correct, that the species which in fact you grow or regrow, if I can put it that way, on that area may not be the same species which was there when you harvested?

A. Correct. In fact, I will go one step

further, as Mr. Martel inferred, some of the other factors I listed: Species, site, stocking, if I go back again I can change some of those as well.

I can certainly change the species as was inferred. I can change the site in selecting those sites in which I wish to put an effort. Sites vary, I can choose which ones I put a variety of efforts into. I can also change the stocking, the arrangement of the trees and how many there are in the area. So all those other factors at the time of reforesting I consider.

Q. Now, are there any particular ways in which these two factors of the structure of the forest and the rotation age, is there any specific way in which they can affect or influence the supply?

A. Yes. The rotation, by changing the rotation - as we will see in later examples - we can increase or decrease the level of the supply. By attempting to change or changing the age class structure, again we may affect the level of the supply in a short-term and long-term intent. Depending on the age class structure we may cut now at a higher rate than later, depending on the age class structure we may cut now at a lower rate than later.

As we will see in later examples, the age class structure as now has quite an impact on the level

at which that harvesting is organized.

THE CHAIRMAN: Mr. Freidin, would you find a convenient place for a break.

MR. FREIDIN: Almost always a convenient time for a break.

THE CHAIRMAN: Okay. The Board will rise for 20 minutes. Thank you.

---Recess at 2:35 p.m.

---Upon resuming at 2:55 p.m.

THE CHAIRMAN: Thank you, please be seated. Perhaps we can wait a minute. There is a number of counsel I see that are not here yet.

---Short recess

THE CHAIRMAN: Okay, Mr. Freidin, I guess we will just proceed. They might have abandoned us for the afternoon, I do not know.

MR. FREIDIN: Maybe they think they understand this stuff.

THE CHAIRMAN: Going to get assessed a late penalty here.

Very well, Mr. Freidin.

MR. FREIDIN: Q. Now, Dr. Osborn, before you go on to the series of documents which are Documents 5A to 5I which deal with significance of age class structure of the forest, I understand that you

wanted to go back just for a few moments to Document 1D which is page 65, new page 65, of the witness statement.

DR. OSBORN: A. I want to emphasize, because this particular diagram is revisited on several occasions and, in a way, it tends to summarize certainly the piece of the panel on sustained yield, and also is very relevant on the discussion of forest inventory and the yield regulation. So this particular diagram tends to synthesize several of the major pieces. I want to come back and ensure that is -- we know where we are with the diagram.

For example, I very briefly mentioned: Why did we have the break in scale. The volume of growing stock value in the forest for whatever forest we are talking about, whatever management unit, whatever species, that value is typically a hundred times the value for growth and depletions. All right.

The growth of the forest is typically approximately one to two per cent of the total growing stock of the forest. For every hundred dollars in the bank, it is a one dollar per year rate of return. Growth rate is a smaller number in relation to the capital of the forest. That's why the change in scale. The same diagram the same scale, the diagram would get

halfway across the room.

That magnitude for relationships between growing stock, total volume, the growth rate and depletions is very key and can't be perceived. The diagram doesn't show it. In other words, the break in scale shows the inference of the complete contrast in these two values.

So as of a point in time, like today, the inventory, the growing stock will be a certain value. On that growing stock the actual amount being depleted, the actual amount being cut and burned and replenished and growing is only approximately one-hundredth of that total growing stock value as of today. So this line here is a hundred times higher than this line here. (indicating)

That's the main point I wanted to indicate because when we talked and we discussed the variations between growth and depletion, counsel brought your attention to the closeness of those two lines, recognize when they overlap, the amount they overlap is very, very small in relation to the actual magnitude of the volume of forest that is out there today and tomorrow.

Q. Now, Dr. Osborn, you described Document No. 4 on page 68 which was directed towards

that part of paragraph No. 9 which indicated that the rotation age was an important factor in terms of determining the manner in which the harvest could be sustained or the level of supply could be sustained.

Do you have any documents then which in fact speak to the significance of the age class structure of the forest?

DR. OSBORN: A. Yes, I do.

Q. And are those the documents which begin at page 69?

A. Yes, they are.

Q. All right. Perhaps you could then, with the use of those diagrams or charts, explain then the significance of age class structure in dealing with the question regarding the sustained supply?

A. Sustained supply is a flow, a production over time and we need to be concerned about the level of, the amount of, and the timing of: How much are we going to get and when.

And there is a range of options you can consider and you have to understand or realize for this unit: What is the level of and the timing of for this unit, this management unit.

So I have a set of examples that I would like to walk through to demonstrate what those range of

options might be. And, in that range of options, the one closest to today's reality will be presented as well and we will then continue with that one to show some more detail.

Let's first of all go through what the range of options might be to show you the sorts of choices occur in Ontario.

For the sake of exemplification, this starts on page 69 of the evidence and continues up to page 77. So the set of diagrams in 69 to 77 are a flow relating to the level of and timing of sustained yield.

We have got 800 hectares of productive forest land. I am going to describe four possible alternatives whereby that land might be looked at and the forest on it managed. So there is four possible examples of how the forest may be organized and arranged on that land.

The first is that the entire block of 800 hectare is trees of all exactly the same age, they are all age one. So as of now, as of today, the entire 800 hectares of forest, the trees are all the same age, they are all age one.

Forty years from today, time 41, all other factors being equal, all our trees are now 41 years old and if we manage our 800 hectares on an

80-year rotation, which was the value we had on the previous document - which is why I wanted to make sure we have that introduced - 80 years is the maturity age we are going to manage this area on, 80 years from today the trees will have all been cut and we are back to age one again.

We are back to the example Mr. Martel was alluding to earlier. We cut the trees, with bare land, we are back at age one. This is the first of the four options.

The second --

Q. Is there any way -- is this diagram being related back to Document 4 at page 68, if you wanted to determine what the sustention or the level of sustention would be in that case or...

A. Yes, it can be, and if you will bear with me I will provide the answer for you.

First of all, I want to go through the four alternative options in an area age class sense and then we'll come back to explain what the volume that might be realized from those areas is.

Q. Before you continue, Dr. Osborn, you referred to these just a moment ago as options and on the documents you have got them as examples, A and B. Is there a difference?

A. No, there was no real reason for the choice of the words. These are four alternative possibilities that exist in parts of Ontario right today. They are theoretical examples of what could happen on the 800 hectares.

In the first case, the 800 hectares, the trees are the same age, age one. The second example, we have half the area age one and half the area age 41.

Q. So the diagram you are referring to now is at page 71?

A. Correct.

Q. Perhaps as you go through this, Dr. Osborn, just for the record, you could indicate which slide you are putting up.

A. Thank you.

On page 71, the second example, the second description of our forest could be that half of the trees are age one, half age 41 at the beginning, as of today and, again, 40 years later the one-year-old becomes 41-year-olds, the original 41-year-old package grows up, is 80, is cut and is replaced as a one-year-old and 80 years down the road our original age one has grown up to be 80 years old, is cut and replaces age one, so the logic ensues.

So on an area basis, the second example,

half the area is age one and half of it is of rotation age.

On page 72 of the evidence is an example where, to continue the line of logic, that 800 hectares is now broken up into 16 blocks and the age of the first block is age one, as in the previous example, the age of the next block will be age six, the third block age 11 and, therefore, the fourth block age 16.

So in the diagram on page 72 we have just taken it one step further, we now have 16 blocks as of today, time one, and each block has a five-year age difference, for all the trees in block labled one are one-year-olds, all the trees in the block labeled 16 are all 16-year-olds.

And again through time, 41 years later the ages would have changed, the one-year-old becomes a 41-year-old 40 years later. 80 years down the road our one-year-old has grown up, cut at age 80 and back and replenished as a one-year-old.

The last diagram of the four examples, the logical extension that's given on page 73 is we now have 80 blocks on our 800 hectares and each block contains trees of the same age and each block is one year different from its neighbor. So we have blocks of one-year-olds, two-year-olds, three-year-olds,

four-year-olds, all the way up to age 80.

An 800 hectare of forest under four different possible appearances today. All the same age, mixes of ages.

The diagram on page 73, as in the previous three diagrams, shows what things might look like 40 years down the road and 80 years down the road; one block of land taken through time, the forest differing in appearance in the four different examples.

Counsel asked me earlier what does that mean in terms of sustained yield, magnitude, timing, how much and when. On page 74 --

MR. FREIDIN: That is a page, Mr. Chairman, which has been changed and, in fact, page 74, 75, 76 within this particular series of documents have changed.

DR. OSBORN: And the changes speak to the numbers being placed on the left-hand axis. We have indicated the value, the amount which in the first diagram at the top of page 64 was 100,000 cubic metres, it is the volume figure. So we have 100 and the values are in thousandths of cubic metres.

And as a reminder, where the 100,000 came from, we have 800 hectares in our forest and each hectare will realize or produce, cut at age 80, 125

cubic metres which was the number given on the diagram Document 4 for spruce at age 80, at the rotation age of 80.

So the document that was given on page 68 of the evidence, rotation at age 80 for spruce had a value at age 80 of 125 cubic metres per hectare. That's really why I wanted to go back and bring that number to your attention because that number is going to surface in the arithmetic.

Q. That Document No. 4 that you referred to was at page 68 I believe, Dr. Osborn?

A. Correct. On page 74 is the first example of the volume, yield that will be realized from that 800 hectares of forest that are all age one to start with.

When it is 80 years old, you cut the whole area, the 800 hectares will realize 100,000 cubic metres, 80 years from today. And in a perfectly normal world it would realize another 100,000 cubic metres 160 years from today, two rotations, two 80-year periods; and 240 years from today it will realize another 100,000 cubic metres.

So every 80 years we have a yield, sustained yield, an amount, in this case 100,000 cubic metres; timing, once every 80 years. And although not

typical perhaps for northern Ontario, it is not atypical for parts of southern Ontario, private-owned land.

The document on page 75 of the evidence shows what may happen under sustained yield, volume, amount, timing when our 800 hectares was age one and age 41 today. Forty years from today the 41-year-olds will be big enough to cut at age 80 and they will realize 50,000 cubic metres because there is 400 of the 800 hectares to be cut forty years from today and, again, they realize 125 cubic metres per hectare.

So in the second example, two blocks of land in the 800 hectares, two different ages, you will realize an amount, in this case 50,000 cubic metres, at 40-year intervals.

The third example we had was where we had 16 blocks of land with five-year age differences. The sustained yield, amount and timing that would come from that is given on page 76 of the evidence.

Q. So this Example C is with the 16 blocks?

A. Example C with the 16 blocks, each block having the five-year age difference. So here, every five years we can cut those trees which reach age 80, the rotation age. Every one of those blocks has 50

hectares and every hectare will realize the 125 cubic metres.

The third example shows again the amount of sustained yield, the level, in this case 6.25-thousand cubic metres, and the timing, every five years.

On page 77, you have come to an example that is somewhat more typical of northern Ontario. The 800 hectares contained in our example every age class from one to rotation age, every age class from one to 80 and, therefore, there was 10 hectares on 80 of the total 800 hectare block.

Every year we can cut age 80, every year the hectare will realize 1,250 cubic metres or 1.25-thousand cubic metres and the volume that is realized, the amount, the level of sustained yield, 10 hectares, 1.25-thousand in this example. The timing in this example is every year.

Those four examples of our age class distribution affecting level and timing indicate the sorts of ranges that can occur, the last one being closest to reality. All are examples of what sustained yield is about.

The question that was asked was: What does age class distribution do to the level of and

timing of. A very simple example of how the age class structure of the forest as of today will influence that response.

Q. Dr. Osborn, could you advise how the Ministry of Natural Resources attempts to provide the continuous and predictable supply to industry which is referred to as the purpose of the undertaking?

A. Much has been described. We will look at the existing age class structure, existing species, existing volumes, and we will look at what the demands, potential depletions being placed upon that forest are.

And in terms of practicing sustained yield, the intent is to provide the forest industry with a wood supply today, the flow in the mill today and make sure it is sustained next year, the year after and the year after that. In terms of practicing, therefore, we will regulate the amount that goes into the mill door today and we will organize and do our best to rearrange the forest to ensure its continuity.

Q. Is there a definition of sustained yield--

A. Yes.

Q. --located in the document?

A. Yes, there is.

Q. Can you refer the Board to that?

A. It is on page 19 in paragraph 5 and, in fact, there are two definitions: Paragraph 5 and paragraph 6.

Q. And I note that in paragraph 10 of the witness statement there is reference to sustained yield management having both a literal and a practical meaning.

A. That's correct.

Q. Is there any correlation between those two phrases, a literal meaning and a practical meaning, and the two definitions which are found on page 19 of the witness statement?

A. Yes, there are. The literal translation of sustained yield has come about by people looking at the words that are in paragraph 5 on page 19. And, in essence, there is an equation in paragraph 5 that says that it is the growth of the forest and the cutting of the forest that should be approximately equal, the cutting and the growth should be the same, and that is sort of the drive behind the words in paragraph 5.

Paragraph 6 offers a degree of practicality and a recognition that that set of words in paragraph 5 is very tight and very constraining

and, in fact, the words in paragraph 5 are predicated upon a set of circumstances, dependent upon a set of circumstances that is called a normal forest.

Under the set of circumstances of having a normal forest, the words in paragraph 5 could literally be translated and put into practise; whereas paragraph 6 let's you have some flexibility, recognizing that the normal forest may not exist today.

Q. And which type of -- which definition then, which appears on page 19, applies or describes the manner in which timber management occurs in Ontario?

A. Primarily the one in paragraph 6 is this allowance for variability within a planning period as influenced by either the state of the market and/or the existing age class distribution.

Q. You indicated that the forest which would fit the description of paragraph 5 of the witness statement would in fact -- is predicated on a set of circumstances called a normal forest.

Is it, in your view, important that the concept of a normal forest be understood by the Board in order to deal with this particular Environmental Assessment?

A. Yes. I would like to use a set of

diagrams to help explain and exemplify why these two definitions appear to have a literal and a practical translation and meaning and the easiest way, I think, to explain this is to illustrate for you what this concept of normal forest is about.

This will perhaps help explain why these two definitions and what they really mean, but it also -- this description of a normal forest is an inherent thought behind how yield regulation is done in Ontario, which will come later in Panel 3. So there is two reasons for why trying to explain what a normal forest are about.

Q. And the diagrams that you indicate that you wish to refer to, where do we find those in the witness statement?

A. They are on pages 78 to 81.

On page 78 of the witness statement you will revisit our 800 hectare forest with 10 hectares of every single age class. Along with other factors, this is an example of a normal forest for that 800 hectare piece and we will identify some characteristics of a normal forest as we go through this set of diagrams.

So our 800 hectares is carved up into 80 10-hectare pieces and on each of the areas, as in the yellow box, all the trees are age one; in the orange

box, all the trees are age 40; and in the red box, all the trees are age 80. 80 boxes, 10 hectares, each box having its own age class.

Q. And by the way, Dr. Osborn, am I correct that the diagrams that you are referring to now, Document 6, are spoken to or summarized in paragraph No. 11 of the witness statement?

A. Yes. As I said in my introductory remarks, I think this set of diagrams will help explain this literal practical meaning of sustained yield.

So we have come back to a diagram that we see in a previous section. However, foresters don't normally portray their forest in this fashion and, as was said in the introductory remarks of this panel, part of the evidence will try and explain form and format because it will be reused in later panels.

Foresters will normally portray this evidence in this sort of fashion where we have area over age class.

Q. And you are referring to page 79 of the witness statement?

A. This is page 79 of the witness statement. We have our forest, our 800 hectares, 10 hectares of every age class and if we are discussing area, this is typically the area histogram, in fact

diagram, that foresters will use to portray, produce, colour look at, understand. So a tool of the trade.

It shows the same information 10 hectares, age 1; 10 hectares age 40; 10 hectares age 80.

Q. And two questions: This particular histogram is a histogram in relation to a normal forest?

A. Yes. This is a characteristic picture of a normal forest, I'll pick out a characteristic of that in a moment.

Q. I was going to ask you and maybe -- I was going to ask you then, what was the significance, if any, to the shape of the particular histogram here where you have got a straight line running across the page?

A. All right. We have in essence the exact same area of each and every age class, this is the same area, normal forest, of each and every age class. There is also each and every age class up to, but not beyond, the rotation age.

Earlier in the evidence I stressed that we would talk about volume. Volume is what the objective is about and volume is what industry is about. So though the area story is important to

understand and picture, on page 80 of the evidence --

Q. Which has been changed.

A. Yes, by indicating the volumetric -- the actual volumetric values, the actual value of 1.25-thousand cubic metres being the volume of the 80-year-olds, and the value on the volume axis of 65,000 cubic metres being the volume opposite the 40-year-olds.

This is the picture for a normal forest of what the volume of that forest looks like. It isn't a rectangle, like the area is. In fact, it has this typically triangular shape and, again, this is the sort of diagram, you have got forest mensuration, forest management, forests growing up, to be able to portray what is my area distribution, what is my volume distribution. This is the shape it should be if it were normal.

You have 10 hectares and in the very young end the volume obviously is very little, we have 10 hectares of the 80-year-olds whose volume obviously is quite large. The triangle is the volume of all the trees in the forest. This is the growing stock, again made up of 10 hectares of every age class on our 800-hectare forest.

Out of those area volume pictures on page

81 of the evidence is a conclusion that can be drawn that if that was pictures of a normal forest, some characteristics of the normal forest were that the 800 hectares, the land was equi-productive for each and every age class, otherwise the triangular volume shape wouldn't have been nice and smooth.

The younger trees, if they had been more productive than the older trees, we wouldn't have a very smooth evenly produced triangle. To have that shape we have to have land that is equi-productive in each and every age class.

Likewise we have to a have normal growing stock, all the trees there are growing the right way of each and every age class. Two characteristics of a normal forest, static, at any particular point in time, those two things have to show to have a normal forest.

Q. And, Dr. Osborn, do you have a series of diagrams that would describe a dynamic situation, in fact, what would happen to a normal forest over time?

A. Yes. What we have got so far is a picture of a normal forest, our 800 hectares showing what it has to look like today, but there are some characteristics that have to take place on that forest over time to assess whether it is normal, not normal, or what is really going to happen to it over time.

Those documents are given on pages 82 to 88.

Q. And perhaps before Dr. Osborn starts that document, page 83 of the witness statement has been changed and that is part of that Exhibit No. 80.

Could you take the Board then through those series of documents to demonstrate what happens to a normal forest over time?

A. What we will try and portray is from today, from the end of time one, from that top line as of today for the normal forest, how will that forest progress and change. You have already seen some pieces of the story already. Well, really it is sort of a repeat of what has been described.

The age ones grow older become age twos, grow older become age 10s, grow older become age 40s, become age 80s and we seen that sort of progression in previous sets of diagrams.

Similarly the orange blocks which were the 41-year-olds today next year become 42-year-olds, 10 years down the road become 50-year-olds, and so on. On an area basis each of the area pieces is getting a year older and eventually gets cut at age 80 goes back to the beginning, on an area basis.

What happens volumetrically. So the diagram that is given on page 83 which, as counsel has

indicated there has been a change in putting on the numerical value, the actual volume in cubic metres that comes off those 10 hectares, don't forget with every age class, so we have 125 cubic metres per hectare and 10 hectares we have got 1,250 cubic metres at age 80.

Q. If I can just interrupt you. This particular document now which shows normal forest volumes over time, does that relate back to the diagram on page 80 which showed the normal forest with 10 hectares of each age class--

A. Yes.

Q. --displayed on a volume basis?

A. Yes, it is essentially tying it up. The diagram on page 80 which is times zero, times one, is echoed in the diagram on page 83.

Q. And just so we are clear, and the document that you have already spoken to on page 82 can relate back to the diagram on page 79?

A. Yes, that is the area breakdown of the normal forest in the beginning, today. So the diagram on page 83 says as of today volumetrically normal forest, 10 hectares of age one, little volume; 10 hectares of age 41, bigger volume; 10 hectares of age 80 biggest volume. Growing stock at the beginning. Normal forest, what will happen to this picture of the

forest over time.

Q. In that particular diagram at page 83, does the total volume of the growing stock in that normal forest change over time?

A. Not the total growing stock won't, the total growing stock will remain a constant. There will always be, in the normal forest, age classes 1, 2, 3, 4, 5, 6, 7 up to age 80. Each of those age classes will have their respectives volumes on them. We are talking about the total growing stock will remain a constant. As you take away the age 80, everything will moves up an age. The growing stock remains a constant.

Q. So you get an equal contribution from different age classes as they grow but the total volume remains the same?

A. You get an equal contribution from each 10-hectare piece of the forest as it becomes rotation age and is forested.

Q. Thank you.

A. Page 84 of the evidence, volume dynamics of our normal forest. How does the normal forest volume change over time. The block in the left-hand corner that was age one in the beginning has now becomes a two-year-old, the 40-year-old became a 41-year-old, the 80-year-old on the extreme right-hand

side of the diagram harvested at age 80 becomes a one-year-old.

Page 5, continuance of the same piece of dynamics, how do we change over time the normal forest volume. Ten years down the road the normal forest the one-year-old becomes a 10-year-old -- the one-year-old area, the yellow block in the diagram, has become a 10-year-old and so on.

So the forest volume is also changing in that each and every age class grows year by year until it becomes age 80 and is harvested.

Continue the sequence. On page 8 we have 40 years down the road, so time horizons are kept constant through all the flow of diagrams. By this time the block that was originally a 40-year-old has now become the 80-year-old; the orange block right in the middle of the diagram is now aged 80, 40 years down the road.

And eventually we come to a whole end of the rotation which is the picture which is given on page 87 and finally, after the end of one rotation, our one-year-old has become an 80-year-old as is evidenced by the extreme left-hand column on the diagram.

What was our 80-year-old is now 79 years old just waiting to turn into rotation age next year.

All of that graphical portrayal gives rise to some conclusions and some characteristics of our normal forest dynamically.

Page 88 lists these first two conclusions we had about a normal forest in a static sense: Equi-productive area, each and every age class, normal growing stock volume on each and every age class all the trees are there.

Three additional criteria. We only took the volume of the trees when they reached age 80, none of the other trees, younger trees were taken away, only the rotation age was cut. All of the volume in Item 3, if all of the volume was taken, on the 10 hectares of the forest we took it all, not some, all of it.

And the last of the criteria dynamically is that every time we cut age 80 back the following year age one came back in successfully, was all regenerated, all 10 hectares. Static and dynamic criteria relating to the normal forest.

Q. I understand, Dr. Osborn, that the next series of documents, Document 8A through I, are directed towards the concept of sustained yield as it is set out in the Crown Timber Act; that is, what you indicated states that you cut the forest growth?

A. Correct.

Q. And could you take the Board through that series of diagrams to explain in a literal way what the application of the concept of sustained yield as stated in the Crown Timber Act would be?

A. On page 19 of the evidence in paragraph 5, literal definition of the Crown Timber Act's definition of sustained yield indicates this balance between growth of timber and timber cut.

The next set of diagrams will illustrate how that set of circumstances can be brought about in the normal forest, how do we do that. And if you think for a moment the growth of the forest, in fact, taking place on all of the trees, every single tree in the forest this year is growing.

Now, a literal, literal translation of those words, infers you peel off that growth and that is what gets cut. You can't do that or a number of trees would die. So you can't literally do what the words would say, but let's exemplify how that growth can be translated into what actually is cut, and this set of diagrams will help understand how the growth of all the trees can be translated into the volume of some of the trees.

The diagram on page 89 is the normal forest's growing stock, our 800 hectare forest, 80-year

rotation, nothing changed, it is the volume picture, so we have this triangle. So the axis shows that we are talking volume of growing stock over the range of age classes on the bottom axis.

I have highlighted, and I am going to talk about the first 10 years of that forest in more detail. This just sort of sets the stage for what part of the forest I am going to delve into.

Q. We are still talking about the normal forest?

A. Talking now normal forest, the 800 hectares, normal.

In year one -- as shown on page 90 in the evidence, in year one the trees that grow in that first year all that they do is grow. The entire tree is made up of increment, which is a forest technical word for growth, increment. The entire tree is made up of growth in that one year.

The diagram on page 91 illustrates in the second year, the block that is labeled No. 2, the one-year-olds have a body of tree on which they will add a sheath of growth. So we have a red 'I', a block 'I', a block of increment on the body of those one-year-olds.

So in the second year they have a body of

material, the tree, one-year-old trees, and they add growth to that; height, diameter, volume. At one-year-old the same again, all they do that first year is grow.

Q. Dr. Osborn, can you just go back to that particular document. Is there any significance to the fact that you have used an 'I' in the boxes to indicate the change from year to year?

A. As the heading infers I have used and introduced the word increment, technical forester's jargon for growth and why I used 'I' is because 'I' is the first letter of the word increment, to be perfectly frank, but just to highlight that each and every age class has that growth on it.

Q. And I know there is lots of jargon that is going to be introduced throughout here, but the term CAI, what does that stand for?

A. Current annual increment. Current annual increment. It is one of the two major expressions foresters will use for growth. There is another one which I will speak at more length when we talk about yield regulation. You have got current annual increment.

Q. Perhaps you can -- without speaking about it, why don't you just define it and tell the

Board what that other way of defining growth is or referring to growth?

A. The other expression of growth is mean annual increment which literally is an average. Up until this point in time in my forest, what has been my average growth rate, my mean annual growth rate.

And perhaps, if I remember, I would exemplify what those two expressions mean when I reach two diagrams' time.

Q. Thank you.

A. In year three, our two-year-olds add increment, our one-year-olds add increment, our one-year-olds, it's all growth. Each and every age class adds growth. So the diagram on page 92 shows each and every age class adding growth, increment.

The diagram on page 93 takes us up to year 10, same normal forest, nothing is changing other than we are demonstrating how the growth is taking place in year 10.

In the column labeled 10, the body of the nine-year-olds adding annual increment. The box on top of that column is 10; nine-year-old body, one year growth.

The column of nine-year-olds, an eight-year body and one year growth, and so on. Each

and every age class is growing. But what this diagram also shows is that what is the column 10 made up of. That column, which I said was nine years' body and one year's growth is exactly the same as if it was the incremental of every single age class up to age 10.

The red increment boxes on every age class, if you slid them all sideways would equate to the volume of the 10-year-olds. The volume of a 10-year-old in a perfectly normal forest is made up of the growth in that year of the one-year-olds and the two-year-olds and the three-year-olds and the four-year-olds. The summation of the annual increment is given as the absolute volume of the oldest age class, annual growth, what do we cut.

Q. If you did that for 80 years down the road and your column instead of being 10 was 80 --

A. The document on page 95 - we have jumped over the Document, page 94, because I was accused of having what looked like a peeled onion rather than a tree - the document at page 95 explains that the growth as exemplified by that increment red line on this diagram, the growth of all the age classes from one to rotation age following the line of reasoning we had in a previous diagram, is equal in volume to the volume of our 80-year-old trees.

So in a perfectly normal forest with all its inherent criteria being met, the literal translation of sustained yield, cut the growth, is the growth each and every tree, each and every age class is putting on in that year is what gets cut by cutting the trees at rotation age. You can't peel off the growth of every tree, but in a normal forest the volume on that growth is the equivalent of the total volume of the trees at rotation age.

Q. Can you relate that back to the Crown Timber Act definition?

A. As the Crown Timber Act definition says, you are supposed to cut year after year after year, when you cut mature trees, trees at age 80 as we have explained before, cut an amount equivalent to the growth which is the line, the diagonal line of the increment, the growth of all the age classes.

As we have explained that, that volume of that growth is the same as the 80-year-old volume.

Q. On page 96, Dr. Osborn, I think you have a list of the requirements of the perfectly normal forest and I believe you have now added three more requirements to the list that you described earlier?

A. That's correct.

Q. And could you indicate to the Board

what the three additional requirements would be in order to have a normal forest?

A. So this is the diagram on page 96 and this is a summary of the requirements for a perfectly normal forest. The first two are the static ones we have already covered, the next three were dynamic ones we have already covered, 6, 7 and 8 on that list are now three new ones that have comeout of that explanation about increment and what gets cut.

In my diagrams about increment, each and every age class grew the same amount. All the boxes of 'I' were the same. The growth of every age class was the same, all age classes grow.

7: In our example we cut the 80-year-olds, all 10 hectares of them only, cutting is taking away from the forest. On the last one, something we raised earlier, is the land base of the forest, the 800 hectares was a constant we didn't have somebody either adding to it or subtracting from it. The 800 hectares inherently was there and was vitally necessary to have 10 hectares of every age class.

So with that list of criteria sum up some pieces essential to have a normal forest.

Q. And just leaving that there, Dr. Osborn, are any of those requirements of the normal

forest biologically unrealistic?

A. If I look in Ontario, Item No. 7 here and now, this very moment, is not happening, the forest is being burned.

If I look at No. 6, all age classes grow equally. I have already shown you a diagram showing how the growth of trees, which was Document 4, the growth of trees changes over time. I showed you a graph in Document 4 of how the volume over time of the spruce stands will look. It was not a straight line, it was a curve.

Q. May we could just go back to that. I understand that that Document 4 is found at page 68?

A. Okay. We are back to essentially this diagram. If the volume product was equal in all age classes, it would be the shape.

Q. Perhaps you could indicate -- describe that shape for the record.

A. The shape for the record is, it would start at zero and would be a straight line culminating at a given age in time. The actual age that will culminate will vary, but it would be a straight line.

The growth, which is the change in shape of that line, every single year would be the same, but it doesn't. Trees inherently grow like people grow,

they start off slowly, they have a spurt, as indicated by the steepness of the curve here, and when they get older the growth rate slows down until eventually they crumble and die. Growth rates of trees are not exactly equal over the whole range of age classes

And so Item 6 all age classes grow equally is biologically unlikely.

Q. Could you describe the significance of the document at page 97?

A. The document on page 97 is a revisiting of the first document presented this afternoon and the document that was re-presented at the front of this particular session, the document that describes volume over time and in a perfectly normal forest the growing stock volume, which is the top line, the top horizontal line, would be horizontal in the past and its future projections would be horizontal.

The earlier question was would the growing stock remain constant over time as we went through the normal forest. And the answer was, yes, this diagram would reflect this. The growing stock would remain a constant in our perfectly normal forest, as would the growth and the cut.

So that initial picture of what is happening to the forest over time: Past, today,

projection which had variable lines, not horizontal, not flat, in a perfectly normal forest would look like this diagram given on page 97.

Q. Having that explanation of a normal forest, Dr. Osborn, could you describe the forest structure of Ontario's forests as we find them?

A. Before I actually start to put the pictures on, I again repeat the rationale to try and describe what the normal forest was and why the literal definition of sustained yield was translated in that way for that picture, that set of circumstances, the normal forest of which some, but not all, the pieces would exist or do not exist in Ontario.

What do we do in Ontario when the actual forest, as I will show in just a moment, is not exactly that normal forest mode. What sort of evidence, what sort of pictures have we got today and how do we walk those towards that normal forest which is a long-term ideal.

This set of diagrams illustrates examples of what do we have today, looking at them in comparison to the normal forest that we've shown, not just look at them and the shape of them, but look at them and the shape of them in relation to that normal forest because that is a long-term theoretical ideal.

So I want to sort of portray them in comparison with what you have already seen as deemed to be idealistic.

THE CHAIRMAN: Dr. Osborn, is there anywhere in Canada that there is an actual normal forest that meets every single one of those criteria?

DR. OSBORN: Not that I am aware of, sir, but at any given point in time some of them, yes. But the point I wish to make about that is: That is a long-term goal towards which one strives. Pieces of it you may achieve at points in time. Keeping at it is also a problem and, in fact, later evidence shows how events managerially will cause you to change.

So in answer to your question directly, I do not know of a single evidence thatI can walk out and say this is a normal forest per se.

THE CHAIRMAN: Well, why would you strive for an ideal which you are very unlikely ever to attain?

DR. OSBORN: The idea originated in countries where the idea of sustention on a unit was nationalistic, in European countries that had so much land they tried to strive for producing this. The management unit intent with Ontario is similar.

On this piece of real estate, on this

management unit we will strive to produce a forest which will supply a set of mills and if we can produce more than that we can produce new industry. This is what we are inherently aiming towards.

There is some imperfections in that. It produces a forest that, with the rotation, when the trees' culminating growth is an idealistic situation, you will get the most volume off that set of circumstances.

THE CHAIRMAN: Is it like the concepts in fact though like we use today, the economic theory of full employment which in fact will never be a hundred per cent full employment, but when you are nearing three or four per cent unemployment you are, for all practical purposes, getting or almost there?

DR. OSBORN: Yes, sir.

THE CHAIRMAN: Is it the same idea? The analogy is the same?

DR. OSBORN: Yes, sir. The same sort of concept. In essence we will try and organize the forest to be flexible to accommodate this three per cent, four per cent, five per cent number that we are allowed to miss by, but I understand your question.

Given that and given that we are still somewhere away from ideal, which is what you asked

about, the northern region - and we have talked earlier the northern region within Ontario, in the map of the area of the undertaking was described as these districts within the area of the undertaking, but that part of Ontario -- in that part of Ontario, this diagram on page 98 says for those areas of forest which are softwood, coniferous of some form; spruce, jack pine, larch, balsam fir, collectively softwoods, the actual area age class distribution at this point in time in the FRI is exemplified by this diagram given on page 98.

We don't have an equal area of every age class obviously. If softwoods are to be managed on a rotation of age a hundred, which is a reasonable sort of average for softwoods in the northern region, the area in excess of age a hundred, the two columns 101 to 120 and 121 plus are in excess of what the normal forest should contain, they shouldn't be there at all if the forest was normal.

When I started to use this kind of age class histogram and I mentioned is typically what foresters will use to portray their forest. They will look at their actual forest, draw this kind of picture and realize what they have got today: How do they walk this towards that long-term arrangement of the forest

with the highest level of sustained yield and keep industry going today. Management in the forest management sense. That is the area picture.

MR. FREIDIN: Q. And if you just hold that picture for a moment. How would the forester then describe the area distribution based on that histogram?

DR. OSBORN: A. Not very normal actually which is quite often. Two or three things: Not very normal, literally it tends to show an overabundance of age classes in excess of rotation age and, without looking at exact numbers, the forest typically would appear overmature in total, there is a large proportion of area in excess of rotation age. The forest is old in total.

Q. Would the term it being imbalanced in terms of age be a phrase that a forester might use?

A. Yes, because if it was balanced in the area age class histogram, all of the columns should be the same for every single age class and as exemplified in this diagram they are not.

Q. And is there any significance to the change in the way the age classes along the bottom axis differ from the earlier diagrams that you use in this situation you described of the age class in 20-year intervals?

A. No, not really. This is a matter of simplicity and clarity. If you remember that diagram of 80, all single little bars, it was very hard to read. Typically foresters will clump, aggregate their age groups into blocks - in this case they are in 20-years, which is traditionally what has been done in Ontario and other provinces for that matter and other parts of the world - primarily to simplify the diagram.

So the fact they are in 20-year age groups is a matter of convenience and a matter of practicality. While dwelling with this diagram, there one new column on this diagram that you haven't seen before, another piece of jargon that is going to be introduced. There is a column on the extreme left-hand side that is labeled B&S. And from where it is on the diagram it is younger than age one.

B&S is short for barren and scattered. The word barren should not be equated to sterile; the word barren means there ain't no trees out there.

Scattered means there are a few trees and it as term would imply they are scattered, there aren't enough to constitute a forest stand, and we will get into this later when we talk about the forest inventory, areas of productive forest which either have no trees, have had trees and/or have relatively few

trees.

I describe in the inventory and where they go in the age class, they go as barren and scattered, so on the age class distribution picture the column of the B&S will be shown.

MRS. KOVEN: Dr. Osborn, does that category apply to a productive non-forest?

DR. OSBORN: Yes, it could. However, in the way the forest resources inventory classifies the lands, one of the first items that gets taken away is non-forested, recognizing - as you ask - that maybe, could be, was productive forest land is currently barren and scattered. Often a very difficult part of the FRI classification unless you know the use the land was being put to.

But, yes, normally the FRI would separate that right up front as non-forested.

MR. FREIDIN: Q. And the source, as indicated at the bottom, Ontario Ministry of Natural Resources FRI Database, is there a particular year that we should be aware of, or is that important to your purposes here?

DR. OSBORN: A. The year given when these data were put together for this presentation would have been last year and this would have been as

of the FRI database as of some time last year, therefore, it is relatively current, more specific in other...

Q. Thank you, that is fine.

A. Page 99 of the evidence again shows northern region of Ontario softwoods, what does the volume picture look like. Remember a normal forest volume picture with that triangle, that triangle bounded by the rotation. What does the age class distribution volume data look like for the northern Ontario softwoods. How close to that triangle do we have.

And the forester will look at area and volume pictures. The same concept portraying but the data for clarity in 20-year age classes, matter of convenience. We have no volume on the barren and scattered, no real surprise. We have very little volume on the 1 to 20, again very little surprise, again there are very little trees.

And so the volume does increase as one would expect it to, but again we have volumes in the 1 to 120 age class and the 121 plus age class which, if we had a hundred year rotation, will be in excess of what we would like for a normal forest in northern Ontario softwoods.

The fact that the columns don't evenly progress, as our theoretical triangle would expect, is reflected in two pieces; two median answers sort of spring to mind to explain them. The first is we don't have an equal area of every age class. The second was each and every one of those age classes may not be exactly the same site productivity class.

The apparent height of the 61 to 80 volume column which is much higher than the 81 to a hundred column - without going back to the area figures - could be because there is more area in the 61 to 80, or the 61 to 80s on average are growing on better sites.

So these simplified diagrams have got a wealth of reason inside them as to why they look the way they look.

Page 100, which happens to be for stands of jack pine trees, blocks of areas, blocks of trees that are predominantly made up jack pine. The area described in this diagram is a management unit up in Red Lake District, a particular management unit, one of the hundred plus, in Red Lake District geographically in the north where we are; it happens to be a Crown management unit.

This is an area distribution, area age

class histogram which, if we ignore the barren and scattered, is not too different from column to column to column. Again, we are looking for a rectangle on the area basis of the normal forest. Except typically in jack pine the rotation is less than a hundred years, so the overmature 101 to 120, 121 plus out there in real life is in excess of what we would except normally in a normal forest, but this particular example shows dramatically a barren and scattered column that is enormous.

That first column on the diagram, the area of barren and scattered, is almost half of the jack pine in Red Lake, because not so very long ago a rather traumatic fire took out half of Red Lake management unit and one of those things that we mentioned in the criteria for a normal forest was that cutting was the cause of the depletion and it was the same amount taken year after year. The natural catastrophy of the magnitude of that fire tends to play merry hell with the age class distribution.

Q. If I could just interrupt for a moment. Mr. Armson, was the Red Lake fire which occurred recently one of the fires that you referred to when you had the infrared photography?

MR. ARMSON: A. Yes, it was, Mr.

Freidin.

Q. And could you tell me, Dr. Osborn, the date that this information -- would this be last year as well?

DR. OSBORN: A. Yes. All these examples were drawn from the FRI database in putting these data together as of last year.

Q. And are you aware as to whether the present fires are in fact occurring in Red Lake District again this year?

A. No, I am not.

Q. Oh you are not, okay.

MRS. KOVEN: Dr. Osborn, it must be awfully difficult to classify the difference between barren and scattered and what are two-year-old trees?

DR. OSBORN: Yes, enormously difficult.

MRS. KOVEN: Especially after a forest fire?

DR. OSBORN: Yes. And when I come to explain the actual procedures whereby these data are classified in the forest resources inventory, that will be described in some detail, because most of the information about both the barren and scattered and young age classes will come from local district staff, not from point of depredation for the very reason you

just raised. On an area photograph - which is how we look at inventory - it is virtually impossible to see the one and two-year-olds. Distinguishing between these is a real sort of error.

The seriousness of that error will show up when we talk about the yield regulation calculations, whether that is important or not, but you are right, in trying to be accurate as to what is really happening in the very young end, yes.

MRS. KOVEN: What you are saying is that the barren and scattered category is often the aftermath of a forest fire?

DR. OSBORN: Or the aftermath of any cause in taking away the trees; be it cut, be it fire, be it defoliation and they die, typically what would come back in the inventory will be what we would call barren and scattered, until somebody - nature or humans - did something, that without putting something back again, would be labeled barren and scattered until something happens to the area of the trees to put the trees back in.

MR. FREIDIN: Q. And there are certain criteria which must be in fact met before trees can in fact enter into the first age class category; is that correct?

DR. OSBORN: A. That is correct.

Q. And those criteria will be described when you deal with your evidence in relation to the forest resources inventory?

A. And in relation to the evidence on yield regulation.

Q. Yes.

A. Really widening up the answer of the seriousness of that misrepresentation.

Q. Thank you.

A. Page 101 is the volume picture for the jack pine on the Red Lake Crown management unit.

Q. That is as of the same time as the previous document that it relates to?

A. That is correct. And one of the reasons for showing this volume picture, apart from the completeness of the record, was if we go back one diagram to page 100, which was the jack pine area picture, the areas of the 101 and 120 and 121 plus, the areas, page 100, are approximately the same, and keep that in mind for a moment, and then refer to the diagram on 101. The volumes on the 101 to 120 age group and the 121 plus age group are dramatically different.

Again, foresters will look at this and

try and have some appreciation of what have I got out there as to what can I do with it and why do the two volume values differ so much. Two possible causes, at least two possible causes. The first is that the sites that the 101 to 120 are growing on could be biologically more produtive than 121 plus, quite possible. The second, and the far more likely explanation is by the time jack pine reaches over 121 years the forest is starting to collapse, trees are dying, there are relatively few trees per acre -- per hectare. The volume on the very overmature jack pine stands is collapsing.

This sort of picture exemplifies that are sort of situation. It isn't necessarily the reason, it is one of the most likely reasons. A local forester would look at this and understand that what was happening to his area has implications in management.

The diagram on page 102 is of the poplar working group, stands of trees predominantly made up of the poplar species in the northeastern region of the province, the area bounded and covering the districts ranging from North Bay around to Wawa, this location in the province. (indicating)

And, again, from the FRI database you can draw and extract diagrams, pictures, the data that show

what is happening to the poplar. Now, on an area basis, which is what 102 describes, this particular picture, there is a real imbalance of age classes. Big surge in the middle age classes of 41 to 60, 61 to 80, a drop off afterwards, what you would expect - poplar tends to break up after a certain age biologically - but a real gap, a real shortage in the younger age classes. A real management implication in the concept of sustained yield. How can we take this situation and keep the forest growing and going with that apparent hole in the area.

On page 103, we have the companion diagram for the poplar in the northeastern region that shows the volume data and here - which we would not have seen from the area data - we have a very large volume in what, for poplar, is a rather old age class in the 101 to 120. There is quite a large volume of poplar in the northeastern region. Now, by this age poplar is starting to biologically get rather old.

Managerially what do we do with that. If we let it go, we just utilize a little of it, it will collapse, or do we make some effort to try and harvest it before nature takes it away.

So these diagrams, area and volume, not only give a comparison with that normal ideal, but they

let the forest managers see what they have to understand, what they can do with it in terms of short-term, long-term management efforts.

Q. Dr. Osborn, you indicated when we were looking at page 101 that the oldest age class breaking up had implications for management and in document, page 102, you referred to the younger age classes as indicating that there was a gap or a hole to be made up.

Does that have implications for management as well?

A. Yes, that lack of the young age classes in the poplar that I talked about that I mentioned has serious implications of how can we possibly keep the poplar growing with that hole; what do we do to overcome 30, 40 years down the road the potential gap in the forest. And there will be a diagram ensuing that will demonstrate how managers can cope with this existing situation.

The last two diagrams in this set were chosen to look at a much younger forest. On page 104 we have the red pine block of trees, red pine working group - working group being a word, jargon, piece of jargon - that is collective to describe trees of the predominantly same species, so this is the red pine

working group including all the stands that are predominantly red pine, much as the last diagram was a poplar working group or the stands predominantly poplar.

The red pine working group in the Bonnechere management unit which is over here in Pembroke District. So the examples show that we can pick differet parts of the database to exemplify this, whatever the piece of geography, here is what the manager is dealing with. There is a question right in diagram 1, forest specific area which is typically the forestry unit, but doesn't have to be, which I was specifically asked.

For the red pine, obviously looking at the 1 to 120 area, a fair bit of time and effort has gone into putting trees or having trees into the ground. Whereas some 20, 30 years ago there was a lack of that.

So the age class distribution in an area gives you a piece of history and you can start to see some things that are happening.

Q. In that particular diagram we also have a gap in terms of the age classes; do we not?

A. 21 to 40 and even the 41 to 60 there is another potential gap in the forest that, if you

manage the red pine on a typically 60, 70-year rotation, somewhere down the road we are going to have to do something in how we manage this forest to fill in that gap. One of the management practices that enables us to handle that will be shown a little later.

Q. I am just wondering - although we will deal with that later as well - could you just give an example of how this particular management problem with that particular age gap that you referred to, how that might be addressed?

A. Yes. There is really two fairly simple tools that we could use. The first would be to try and ensure that the old age classes, the 61 to 80 and the 81 to a hundred, to try and ensure that we didn't take all of those when they were aged 80, rotation age, but we kept them longer than was ideally desired, we kept them until they were 90 or until they were a hundred, we stored on the stump. We tried to keep a part of the forest longer than would be idealistic. That is the first way of doing business.

The second would be perhaps to do something with the 1 to 20 age class; maybe we could do some treatment to it - I will explain what kind of treatment in a moment - something to it to make the 1 to 20s look like and react like 21 to 40-year-olds.

Maybe we could thin them, take some of the trees away, let the remainder grow faster. Maybe we could fertilize them. We will do something to change the growth rate, some silvicultural action to make the 1 to 20s behave like and fill in part of the 21 to 40 age classes.

If there is a gap two main choices: Turn on the young ones, make the old ones last longer.

THE CHAIRMAN: Mr. Freidin, I think we are going to take another break at this time, and I am suggesting that in view of the evidence today, which is essentially of a technical nature, that we do not go beyond 6:15. Normally we might be willing to sit later, but I think there is a limit to what everybody absorbs, certainly the Board, and I would suggest the other parties as well.

There is nothing against the evidence you are trying to give, Dr. Osborn, but we have to sit and concentrate carefully in order, I think, to follow it.

DR. OSBORN: I understand.

MR. FREIDIN: And in terms of the evidence which is coming, Mr. Chairman, I think management units we are going to spend not much time on. The forest resources inventory is technical, but I think there may be a bit of a respite from this

technical area but, unfortunately, only for a fleeting moment because when we get into yield regulation, I think this pales in significance in terms of the rate at which you must go through those diagrams to have them explained.

THE CHAIRMAN: We will be back in 20 minutes.

---Recess at 4:33 p.m.

---Upon resuming at 5:00 p.m.

THE CHAIRMAN: Thank you, be seated please.

Mr. Freidin, I have instructed Mr. Mander to type up a letter to the hotel manager concerning the sound system, which I will sign, and see if we cannot either get a decent system or have an appropriate sound technician to check it over and make sure that we do not have these problems every single day.

MR. FREIDIN: Is that the sound system that I hear humming?

THE CHAIRMAN: Yes. It has something to do with the sound system, or some interference with the wiring. It is affecting the court reporter's reception, of course, during the process of preparing the transcripts. It is just plenty annoying I think for everyone to have to shut down every other day to

have somebody adjust it.

We are going to be here for an awfully long time, so I think it is encumbent on us to get it settled once and for all, and we will certainly do what we can and Board staff.

MR. FREIDIN: I think the problem the last time we raised this matter that somebody said it was the wiring into the hotel but...

THE CHAIRMAN: Well, we have got a wire from the coffee machine running down to the lobby over the railing, maybe they need a wire to a sound machine out of the building into some other building, I do not know. We will find a way.

Okay, let's go on.

MR. FREIDIN: Q. Now, Dr. Osborn, we were discussing the series of documents commencing on page 98, which is document No. 9(a), (b), (c) and (d) and I understand that those documents are in fact related to paragraph 13 of the witness statement?

DR. OSBORN: A. That's correct.

Q. And I think when we broke you were at the last document in that series, which is at page 105, and perhaps you could sort of follow on your evidence then and describe it?

A. Paragraph 13 speaks to the area and

volume, actual distributions in Ontario, examples of, to exemplify what we have in reality is sometimes far from and sometimes close to that normal situation.

So this last diagram in that series is the red pine working group, red pine stands, in the Bonnechere management unit which is in and around Pembrooke.

This picture, again, we were trying to find how close this is to that volumetric triangle of normality. We have trees up to age a hundred, which is possibly a little bit beyond the limits, the rotation we usually run red pine to, but very little after that. So, in that sense, this picture is fairly good. But there is quite a profound drop off, particularly to the 21 to 40-year age class.

Q. I am just wondering if you can go back to that one again.

A. Before I go back, I would like to just go back to one diagram for the Board's benefit, which is a reminder of the area values for the red pine in Bonnechere, because I want to bring to their attention the amount of area in the 1 to 20 age group, quite a large area, and I mentioned before this was because there was some activity in replacing or planting or seeding the red pine in that unit.

Now, the area column is quite large, yet when we turn to the diagram of the volumes, which is page 105, the volumetric volumes in the 1 to 20 age class are very, very small. One of the reasons for this is that within the forest resources inventory upon which these numbers are based, the volume estimates are produced for age 20 onwards. There are no volumetric estimates given for trees up to age 19.

So the volume estimates in the 1 to 20 age class, we have seen the area is very large, one of the reasons the volume estimates in this diagram for the 1 to 20 age class is small, is that it is only the 20-year-old volume given on that diagram. Any trees aged one to 19, because of the way the FRI is produced, the forest resource inventory is produced, there are no volumetric estimates for those younger trees.

This is almost an aside that you have to be careful, when you use these types of portrayal of the data, that you are fully aware of how they were put together, as well as what they really might mean about the forest. So that apparent difference between the large area and the very small volume, in this case, is because of the way the volumetric data are compiled.

Q. And would it be more convenient here, or later when you deal with these FRI estimates, to

explain why there is no volume estimate for all the lands in that area?

I don't want to take you too far afield on a long explanation.

A. In terms of continuity, I think it would be easier left as a flux statement at this time and I will explain why later.

Q. And, Dr. Osborn, what do the documents that you just reviewed, the documents which form Document 9, indicate in relation to sustained yield, the subject matter we are discussing?

A. When we talked about the normal forest and we went through the set of examples of the area and volume of the normal forest, we ended up with a list of criteria which I will re-portray in a moment.

And there are certain things about the normal forest that we described, particularly the area and the volume distribution, we also spoke about growth rates, equi-productivity, but there are some other factors as well. What we have seen in the last set of diagrams, four examples, four different parts of the province, is that the actual situation which may differ - in some cases a little, in some cases a lot - from that set of normal circumstances.

And, again, coming right back to the

beginning, the objectives of management, the purpose of the undertaking was a continuous/predictable supply. Continuous in the sense of trying to keep the mill going, the wood going into the mill now, next year and the year after. Continuous in the sense of trying to ensure the forest structure was that which best gave rise to that continuous supply.

Idealistically, with the resources to be managed we would like to make the best use of it, the higher we can raise that level of predictable supply, given there is a market, the better we are off to the resource of Ontario, the better use we make of that resource in a timber management sense.

So the forester is looking at keeping existing industry going and trying to manage the forest to ensure that the existing industry will be maintained and perhaps increased. The 'perhaps increased' comes from that manipulation of the forest, that age class distribution, and it is really why we spent so much time and effort in trying to portray what we can do with that and what is it like today.

Q. And in terms of the characteristics of a normal forest, those are listed on page 96 of the witness statement, and you have actually described that. To which of the requirements then does the

series of the charts, Document No. 9, refer to?

A. The diagram on page 96 of the evidence, in the list of criteria we talked of the need for land, of equi-productivity in each age class. Some of the diagrams we have just shown have indicated that the volume and area relationship is almost certainly different because the range of the productivity on the site classes may differ. So the first one isn't necessarily always borne out in Ontario.

We talked of Item No. 2, normal growing stock volume. Again, we have looked at these volume and area relationships in the actual forest to see that we don't necessarily have an equal volume per acre across all age classes. The second one hasn't typically been met, it ranges.

Now, those first two are really the two that have really been exemplified in that set of diagrams about the existing conditions in Ontario.

Q. Looking at paragraph 13, Dr. Osborn, it speaks of the forests in Ontario in reality are not normal but are, therefore, diverse usually imbalanced in terms of area and volume by age class, and I assume that's what you have just shown us in the document that you have discussed?

A. Correct, that was in Document 9.

Q. It goes on to say that they are usually imbalanced in terms of species composition, tree size classes, and site productivity.

Would you describe for the Board what those factors would be in a normal forest and what the situation is in real life?

A. In the first of the three items, we are talking about species composition. A normal forest required equi-productivity. Between species that is a possibility, but most unlikely. So the greater the diversity of species in any one of these forest areas that we are looking at, the greater the diversity, the more unlikely it is to achieve some of those criteria we listed.

We mentioned when we described -- we were talking of jack pine working group, red pine working group, poplar working group, stands that were predominantly, but not necessarily exclusively poplar, in the case of the poplar working group.

The more diverse that situation is the more difficult it is to end up with that equi-productive situation. Also, the more difficult it will be to ascertain what the ideal rotation should be. Because species biologically grow at different growth rates, they reach maximum size, the growth rate falls

off according to their species characteristics.

Poplar will grow faster than black spruce, usually. So the setting of the rotation, which was a necessity to know where to define the length of that normal forest, the length of time span for that forest, that species diversity will make that more difficult to pin down, to be precise.

The second of the three items was tree class size, tree diameter size; sizes, dimensions of trees. Foresters will talk primarily about diameters of trees.

The normal forest more or less presupposes that each and every age class has trees in it of more or less the same size class. You would expect your 50-year-old trees on the same site and the same species to be approximately the same size. If you took a trip sideways into the forest, you would find that the range of sizes even within an age class for a variety of factors, genetic or for the site, will vary.

So our 50-year-olds will have a range of tree sizes, and this could be exemplified - and everybody has seen it, if you see a plantation where theoretically all the trees are planted at the same time, and obviously the trees vary considerably in size.

Again, when do we set the rotation for a particular industry, to what trees of a certain size if there is considerable variability in tree size within any age class.

You set the rotation, for example, at age 80, on average the most suitable rotation for that species for whatever product we had in mind. The greater the range you put down to the size at age 80, the more difficult it is to be more efficient in running that wood to and through that mill.

The third item in the list was the concept of site productivity, which is the third item mentioned in paragraph 13 of the evidence; or any of the diagrams presented, I have made allusion to this range in productivity, the fact that our 21 to 40-year-olds had a greater volume for a given area than the 41 to 60s.

I made reference to the fact that it could be that the 41 to 60-year-olds are growing on a better or a poorer range of site classes than the other age group. Again, I think what typically happens is a mix throughout the forests in Ontario.

Q. And, Dr. Osborn, could you comment on the application of the literal definition of sustained yield in these unbalanced forests which you have described as being more characteristic of Ontario's

forests?

A. The literal translation asks us - and this is paragraph 5 of the evidence - the literal translation asks us to equate the cut with the growth rate. It asks that the growth of the forest be the indicator of the level of cut.

And if we were to look at some of the forests 'growth rates that I have showed you, you would find that the growth rate of the very old stands, the very old trees, slows down. So if you have a forest which is predominantly old, the overall growth rate of the forest is slowing down. The more older the stands, the more older trees you have, the overall growth rate of the forest will be reduced.

If you just cut just the growth of such a forest, you might find that that old forest is being perpetuated and made worse because you might find the growth rate is so slow, that if you just cut that, the forest's capital is going to build up and build up and build up.

The converse is with a very young forest; young forests, young age classes, typically have a very high increment, growth rate. Young forests are quite vigorous.

If you took the literal translation, the

forest is growing young, it is young, it is growing well, you should cut very heavily and, yet, in a young forest you may in fact not have trees of an economic size to cut and if you were to cut at that very high rate you would end up, or potentially end up reducing the forest to nothing very quickly.

So the literal translation of cut the growth rate was only really true based on the concept and the reality of an actual normal forest. If we have a normal forest then cutting the growth rate, as the diagram has explained in old forests show, we can cut the growth rate and year after year after year cutting just the growth rate, growing stock remained constant, and we showed diagrams to at that effect.

If the forest is not normal because it is immature or overmature, the growth rate is opposite of what really should be the driving criteria.

Q. Now, the situation where you harvest the oldest -- where you have got an overabundance, is there a term which is used for that management approach to in fact sort of harvest that area as soon as possible?

A. As will be explained later on when we talk of yield regulation, we will use the expression accelerated cutting, and we will explain how and why

that is practised. With an overmature forest, with possibly a lower overall forest growth rate, we find it wise to accelerate the cutting to bring the forest back into a more normal situation.

If I use an analogy: You have money invested in the bank and you have part of it yielding very low rates of return, very low interest, very low increment on your capital. As wise money manages, one tends to liquidate those investments and to reinvest them in high yielding.

The analogy is very appropriate to forest management. We like to take those slow-growing overmature trees, given there is a market for the product, cut them faster than normally would be expected and reinvest it in the young end of the forest.

Q. You mentioned the phrase 'given there is a market'. Does the marketplace have an effect on the forester's ability to manipulate the forest towards normalization?

A. Very much so. In the degree of pragmatism and practicality, it doesn't behoove us to go out and cut the trees down if in fact there is no use for them. To that extent, therefore, even if the forest is immature, overmature, we have to take an

awareness of the first of the two forest management objectives and, that is, to keep the forest industry going.

If there is little demand for that species, product, kind of tree, we do not go out and cut it for the sake of just trying to get the forest into a "normal situation". That first part of the twofold objective, continuous/predictable, continuous of having existing industry kept going, that first part is a very important criteria, very important part of forest management.

THE CHAIRMAN: Why do you not go and do that? Why won't you, even if there is not a market at that time, nevertheless try to bring them forward into a normal situation and bank on the future that there will be a larger market and you will have a more productive end of the forest certainly than that.

DR. OSBORN: Two reasons would spring to mind. The first would be very literally dollars and cents today, who will pay for that story, based upon an estimated future which may not take place. That's a gamble which could certainly happen and no reason to think what the probabilities of the future might be.

The second reason - and it comes back to a question, Mr. Chairman, you asked earlier - striving

towards, in the examples we have been given, our perfect forest on a 80-year rotation, striving and spending time and effort to get that situation, particularly if it takes some time, may well be often not, if 20 years down the road or 30 years down the road the industry decides that they can use 60-year-old trees. So ideal is a dynamic ideal.

It is not an impossible to sit back today and say: I will strive and do everything in my power for my 80-year-old rotation normal forest because by the time, from now, to reach that goal, all sorts of events may have taken place over which I have no control which cause me to wish I hadn't taken that particular avenue.

Historically, perhaps not so much in Ontario that I can think of, but certainly within Europe there are living examples of where that has happened. In fact, I can cite a particular example in the UK where I got brought up, where in the 1800s the oak trees were managed at that time for a very deliberate product, the British navy for which the cutting of the trees, 12-feet high could produce nice wavy boughs to make wooden ships, was absolutely an ideal, a management objective for those forests.

Oak trees typically take 120 years to

grow. Along comes the 1840s and 1850s of non-wooden ships, metal ships. That management objective - no pun intended - gets blown out of the water. Those trees grown for that objective are now completely the wrong shape to produce the boughs. Technology unfortunately moves - perhaps fortunately - much faster than the inherent growth rate of the trees.

THE CHAIRMAN: What if you took it theoretically the other way. Suppose it was not enough to and you did not cut your over mature forest and you just allowed them to deteriorate, then your regeneration of the new forest would take that much longer and then if demand did specific up 30 years down the road, because you had not managed it appropriately, would you be in a position where you could not meet that demand at that time?

DR. OSBORN: Yes, sir, and that has been thought about, as I said, through that would be unfair, that has been thought about, giving some real thought to how do we take that particularly mature -- over mature forest away to better balance the the age classes and the full process is how do we do that cheaply, and the tool that we have thought about at moment aren't yet practised for reasons that will be explained in a moment, the tool thought about is fire.

One of the cheapest ways of taking away the other mature forest would be fire, unfortunately we don't have very good control over that tool and so we are a little bit modest to attempt to at this point in time, but that has been given thought to see what the implications might be of rearranging the age classes for some hypothetical future, certainly.

MR. FREIDIN: Q. And, Dr. Osborn, is there anything that you are aware of in the timber management planning process which in part responds to the uncertainty of the future and the predictions that you can make about the future?

DR. OSBORN: A. Yes. In the first set of diagrams, some method was made to indicate in the time scale we had a series of planning horizons and we described that there was a 20-year short-term horizon and within that 20-year time horizon there was a first five years' special time horizon, and the reason for that was literally to answer this type of question, knowing the technology moves so quickly, knowing that what might seem ideal for today may change one, two three, four, five, ten years down the road. The relook at what should be my ideal is done on a five-year cycle.

Q. Dr. Osborn, do you have in the

witness statement any documents or graphs which in fact demonstrate the situation that you have described of there being an immature forest?

A. Yes.

Q. And do we find those under Tab 10?

A. Yes.

Q. I understand that the first page 106 has been changed, it is one of the documents which appears in Exhibit No. 80, and could you just advise the Board what the change is between the two documents, the one in the witness statement at page 106 and the document which is part of Exhibit 80?

A. The main change in this particular document was to -- let me back off. The main change is the fact that there is a summation column of what was the total area, the total increment and the overall increment for the whole of the forest, was the main change.

The purpose of including this particular document was to try and portray that the actual increments - increments we described in the normal forest that were equal, actual increments as exemplified in the Bonnechere red pine that we have already described - are not the same as evidenced by the last roll of data, which takes the current annual

increment divided by the area, so it is on a per hectare basis or, in this case, on a per acre basis.

The actual values, particularly the 21 to 40 age group, some 89; and the 41 to 60 age group, down to 27; the 61 to 80 age group, down to almost 20, those growth values are not equal. And, as was explained about five minutes ago, the young age classes will show values typically quite high in current annual increment. As the forest age classes become older the growth rates will drop off.

These are actual data and so that drop off isn't perfect, and so we have a very large value suddenly surfacing on a very small area in the 101 to 120 age group. Again, we will have -- not anomalies in the data, but we will have actual data causing some variations in what the theory would indicate.

The diagram is primarily to show for this kind of forest quite a large area in the young age groups, some areas in the rotation age groups, that the growth rates in fact do drop off as we get into the older age classes.

Q. And I understand that you have some other charts in Exhibit No. 80 which don't appear in the book at all--

A. That is correct.

Q. --which identify immature forests in other parts of the province, in other management units, and I think they probably are -- maybe the last three, but perhaps if you could put the slides up and we can see which ones you have there.

A. The example I gave for Bonnechere in the previous diagram didn't have a good representation in the very young age groups, so I went looking through some other parts of the province that were predominantly young. Within the area of the undertaking this wasn't easy to find, being as how much of the forest in the area of the undertaking are predominantly old. So trying to find young examples wasn't easy.

The area for Timiskiming - Timiskiming is over in Kirkland Lake District in the northern region - you are looking at jack pine in Timiskiming and, again, the data show a drop off in growth rates as we go from the older to the younger trees.

The next example I have is red pine in Kirkwood. Kirkwood is in Blind River District in the northeastern region. Here we are looking at red pine in Kirkwood management unit, a predominantly, but not exclusively, young part of red pine. Again, the growth rates in the bottom row show this drop off towards the

younger age -- the drop off in growth rates as we move into the older age classes.

Q. And in these particular diagrams which you are referring to the growth rate, do they correspond then to page 93 which is the actual growth rates as opposed to what you describe on page 93 in the normal forest?

A. Yes, these are actual growth rates as opposed to that criteria of starts in the normal forest to the equal growth rates. Another example of the age, the volumes weren't exactly the same as normal, the growth rates, also don't exactly marry this ideal.

The last of the additional diagrams - and I am going to come to an overmature one which is in the evidence - the last of the additional diagrams, actually some red pine in Bracebridge, down here in the Algonquin Region in southern Ontario, and you may notice there is an aside; many of the young examples have been taken from the red pine working group.

I mentioned before there was some difficulties in finding examples of forests that are typically young. The fact they are primarily in the red pine is going be an item that will come back again when we start talking about the forest resources inventory and maximum allowable depletion.

The young forests in Ontario typically are in a plantation cut species, particularly red pine, if the forest is predominantly young.

Q. Do you have diagrams -- one additional diagram in relation to overmature?

A. Yes. On page 107 of the evidence, and this diagram has slight modifications to the one on page 107 by the inclusion on the far right-hand side of the numbers on the bottom of a summation total. There is a column in this picture that was not on page 107, otherwise the diagram is the same.

This shows for overmature forests, and it shows for a different working group - for, in this case, spruce - and we are now geographically in Long Lac up in the top end above Terrace Bay in the northcentral region, we are looking at spruce and you will notice in the growth rates in the bottom line on that diagram there is not so much of a dramatic peak and drop off.

Each species will have its own sort of growth rate typical curves. In the spruce situation there is still the drop off into the older age groups, as was explained before, but neither the peak nor the fall is as acute or as evident in, say, the pines. So each species has its own inherent way of growing.

This diagram at the same time is not atypical example of an age class distribution in particularly the north, the boreal, in the spruce boreal species where, if the rotation age was 80, as the diagram infers, the area and the volume beyond rotation age is incredibly large, the forest is very overmature. 80 is the most desirable age at which to cut spruce in Long Lac. What do we do now with all that overmature forest, which, Mr. Chairman, was part of the question you were asking earlier.

Q. Dr. Osborn, in paragraph 14 of the witness statement there is a discussion about there being an overabundance of mature age classes in one case and there being an overabundance of young age classes in the other case, and I think that has been described by you.

It indicates in the last four lines in relation to an overabundance of young that would indicate that these trees may be too small for economic cutting. What do you mean 'too small for economic cutting'?

A. Two factors: The trees themselves when they are young, 30, 40, 50 years old, their size, individual tree size may well be so small that you cannot afford to cut them and process them through the

mill and if they are too small for whatever the processes may be, to harvest them -- sorry, to process them.

So if we are talking about the saw mill at that point in time, not many saw mills will operate with very small material. There is some economics involved.

A second economic parameter, if you like, is when the trees are small you have to cut a large number of them to realize a certain volume and sheer economics of cutting and harvesting and holding is such that the more pieces you handle per cubic metre the more expensive the game is. When trees get very, very small you reach a break point where you cannot literally afford to go cut them without making a loss.

This is very, very much the case with young trees, the same in a way has some relevance about tree size irrespective of age.

MR. FREIDIN: If I may just have a moment, Mr. Chairman, I think we have covered off more than...

Q. I would just like to give you a couple of hypothetical situations, Dr. Osborn, and tell me what actions would occur in that forest that I described if sustained yield was interpreted literally.

The first hypothetical would be age of maturity of the forest is 80 years, rotation age of 80, and all the trees are 90 years or older.

What would the literal application of the definition of sustained yield require you to do or allow you to do?

DR. OSBORN: A. It would depend to some extent on whether the 90 year and older trees were growing at all; for example, if they are growing they probably would be growing very slowly as is just evidenced by the data in the last few diagrams. The slower they were growing and cut if they were not growing at all, theoretically, literally no cutting would be allowed. Cutting was supposed to be equivalent to the growth rate. If the growth rate is zero no cutting takes place.

As was asked about before, the forest will continue to grow and stagnate and it would be not allowed to be cut at all, if you took the extreme.

Now, the growth rate for 90 plus would not be zero, but it would be low which means the growth would only allow a low level of cutting and if you are going to maintain that overmature decadent, not very effective forest, which is like perpetuating an investment with very, very low rate of interest.

Q. The second hypothetical, you have a normal forest - you have actually got one, you found one - and you want to increase the growth rate through silvicultural activity.

What would the literal application of the definition of sustained yield allow you to do, if anything, in relation to that desire?

A. Theoretically you really shouldn't do that. If you change the growth rate you are most likely going to change the rotation, you are going to let the forest grow to be a size you require in a shorter period of time; you have changed the rotation, you have upstepped that equilibrium that you have built up.

So, theoretically, in a way you shouldn't be allowed to do that improved rate of growth without having to re-think how you now want your forest on a 60-year rotation instead of a 80-year rotation.

So the theoretical translation of the literal sustained yield tends to preclude against improvements in the status quo.

Q. Does the application of the literal definition of sustained yield have any economic implications?

A. Yes. Again, given we want to make

the wisest use of the resource from a timber management point of view, the faster we can turn over our investment, the faster we can make the forest grow - again, given its marketed - the more effective we are in the management of that capital, that resource.

The banking analogy: we want to keep our capital small and have as high a rate of interest as possible. In our forest, we want to keep the forest growing at its highest level of increment as is possible, through whatever means.

If we keep the sustained yield concept, we have a possibility of sitting in a stagnant situation, we may maintain and perpetuate a situation that we are not allowed to improve upon.

Q. So building on the question from the Chairman, what would the literal application of the definition of sustained yield say if you had a normal forest but a market change took place and you could actually market more than what would be allowed to be harvested through literal application of the definition?

A. If you don't change the rotation you really can't take the benefit of that market arising.

Q. In your description of the age class distribution of the forests, you referred in a couple

of places about gaps in the age classes and, on page 108 of the witness statement, you have a chart entitled Gaps In Age Classes and Timber Management Options.

I want you to take care not to repeat your evidence, Dr. Osborn, but I would ask that you describe the purpose of putting in the diagram on page 108?

A. There are really three diagrams to be considered: Pages 108, 109 and 110. The diagram on 108 is a possible volume over age class distribution of a forest where there is, as the diagram shows, age classes 1 to 40, and age classes 80 to a hundred, but there is nothing between 40 and 80 and we have a rotation age of 60.

Now, it was a hypothetical set of data but in all honesty at this point in time it's not too dissimilar from New Brunswick as a province. New Brunswick had a fairly aggressive, a large chunk of 1 to 40-year-old forest, they had some tattered remains of some overmature 70, 80, 90-year-olds and a big gap inbetween because of the spruce budworm historically.

This is very much the New Brunswick picture in real life. Given this exists in parts of Ontario, which it may well do, what do we do about it. We really have two choices, two major choices.

The diagram on the page 109 is really the first of the two choices. Over 20 years our 1 to 40-year-olds will grow to be the 20 to 60-year-olds, so this is what may happen over the 20-year period from now to 20 years down the road.

Our 1 to 40s have become 20 to 60, at that time, 20 years down the road, we can start to cut the 60-year-old. So 20 years down the road we're okay. What do we do from now until year 20.

What we try do is make that very old part of the forest hang on long enough to supply the industry, such that - and then we replace it to be over the 20 years for 1 to 20-year-olds. How do we make it hang on long enough.

And, again, New Brunswick practices demonstrate this. They make every effort to protect that overmature forest from further natural depredation. Whatever practices they can have to make that overmature forest supply last for the 20 years, they try and do. That is the first of the two main options.

Q. And the phrasing you have used earlier in your evidence, storing on the stump, is that the equivalent of spreading the old forest?

A. Yes, yes.

Q. By the way, is storing on the stump always an option?

A. It will vary with the species and it will vary with the age of that old forest. Some trees, some forests, some species you can store on the stump. For example, within Ontario spruce can be stored on the stump up to certain ages quite well and, in fact, the Ministry has undertaken a series of studies to literally see how long different species, under different conditions, can be stored. And certainly there is evidence that spruce can be stored in some locations up to 150, 160, 170-years-old, certainly beyond rotation age. There is a series of studies on-going at the moment to look at jack pine.

Now, the exact answers I personally don't have but, because of the nature of jack pine, it cannot be stored that length of time, it will break up it, will become rotten, collapse literally from the inside. So it will vary with species as to how long you can store it.

Q. And, Mr. Armson, did you in your evidence refer to the type of site on which you would be more likely to be able to store on the stump than on the options?

A. Yes, I did. The studies that were

referred to by Dr. Osborn showed very clearly that on the more productive soils the spruce could not be stored as readily as it could be on the less productive sites.

DR. OSBORN: A. The second of the two options - this is given on page 110 - the second of the two options is to concentrate one's efforts on the young part of the forest, that block of 1 to 40-year-olds, what can we do with those in that 20 years to cover off our gap.

In the situation where we cannot store the old forest for 20 years, what else can we do. The example on page 110 shows in the far right-hand side of the diagram the old area only hung in for ten years. Because of the nature of the species, nature of the sites, state of the forest we couldn't keep the old forest for 20 years that we'd like to, it would only hang in there for ten before it all disappeared.

And so what we did is we went into the 1 to 40-year-olds and we did something that caused them to grow faster than they normally would have done. Again, New Brunswick practices events in the 1 to 40-year-olds that will cause them to grow faster. The typical forestry operation is thinning.

So the diagram shows there has been a

stimulation from the dotted line, which is what you would have expected without treatment, to the higher solid red line, the stimulated growth rate increased volume through forest management practices such that by age 50, instead of 60, we got that forest up to a size and volume that was the equivalent to the old 60-year-olds; changed the rotation.

Q. And could you advise the Board, the panel in fact will be speaking of the silvicultural activities which could stimulate the growth as you have indicated?

A. Yes.

Before I leave this, I would like to make the obvious statement is that you mix and match these two extremes depending on the circumstances. They aren't exclusive, and New Brunswick has mixed and matched, depending on the local area, those two apparent extremes.

Q. In paragraph 16 of the witness statement, Dr. Osborn, you state that the effect of changing the choice of rotation age or maturity will be illustrated by examining the results in a normal forest. Similar effects would be expected if the rotation age changes because of intensive silviculture.

Why do you want to address the effect of

a change in rotation or why do you choose that as a subject matter to speak to?

A. In the description of the forest management, its objective, normal forests, we introduced a term rotation and, in fact, the choice of the rotation had quite a dramatic impact on how we organized our age classes.

We want to pick, we did pick -- didn't have to pick, we did pick 80 years and we realize the forest to best portray the division of the forest over that 80-year rotation. However, what may have seemed the most desirable rotation when we first started that, trees reached the most appropriate size after 80 years, now may be changed in that in trying to be more efficient, as I just mentioned, to make that turn over of our resource faster, most forest management activities are geared towards reducing the rotation, in fact, a considerable time, effort, money, research goes into trying to produce the same volume in a shorter period of time.

There may be - and there are examples of for the change in product, a lengthening of the rotation. This is not uncommon and the product has to be a lot more valuable if you are going to increase the number of years, because the years are costing you

money.

So the emphasis primarily is to shorten the rotation. This is a drive towards efficiency.

Q. What might cause you to change the rotation?

A. Two factors sort of spring to mind. The first is that industry has found a way of cost effectively using smaller sized trees and this can be exemplified in Ontario, has happened historically.

The second is the forest treatments, the operations in the forest can cause us to grow the trees to the same stated stipulated size in a shorter period of time. The net effect is the same, fewer years.

Q. And if industry wanted larger diameter, say, for saw logs, what might happen with that effect on rotation?

A. Yes, you could lengthen the rotation if you were looking for larger trees although, as I just mentioned, that comes at a price. It would really pay you to try and find some treatment to not lengthen that too much.

Q. Could you turn to page 113 of the witness statement, and this document has been -- is included I believe as part of Exhibit 80, and if you could just describe the change.

I believe it adds the words 'from 80 to 60' in the title?

A. Yes, I am looking at -- I think there is three. The title was changed that the second line reads: When rotation changed, and the words 'from 80 to 60' have been added to what was given on page 113.

The left-hand of the two sub-headings that did read just Options, now reads: Options for Cutting; and in that left-hand column of Options for Cutting under Item No. 5, the last line reads: Older Stands as opposed to Other Stands.

An addition in the title 'from 80 to 60'; an addition in the sub-heading Options for Cutting; and a change in the last line from Other Stands to Older Stands.

Q. And this particular document refers to blocks currently aged 60, 59, 58 et cetera. Do those have any reference to any earlier diagrams?

A. Yes.

Q. Perhaps you could take the Board through this particular document and indicate the purpose for which it was prepared?

A. Page 111 contains a diagram, it is very similar to Document No. 4 which just had one rotation in it, it had the original rotation at age 80,

as has already been shown.

The document on page 111 shows there is possibly a change in the rotation either at 'y' in which case was a choice of a younger rotation in the bottom of the diagram, or it may have decided upon an older rotation as exemplified by 'x' and, as the bottom shows, we have an older rotation.

The diagram really took a previous diagram you have seen before to show you the change. The purpose of that was to demonstrate what is given on page 112, and we are back now to our relatively familiar volume over age normal forest type diagram.

We have the volume on the axis and the age classes from 1 to age 80 and we have normal 80-year forests. And I have taken one the two examples in the previous picture and changed the rotation now from 80, which is what this diagrams shows in totality, to 60.

Certainly industry could cut trees at age 60. It wouldn't happen quite that dramatically but, however...

The question now surfaces as given we have this state of affairs, what do we do with this apparently surplus volume in the red part of the diagram. So we have now got our forest, we have made effort to produce it on 80 year rotation, events have

changed on us. What are the options?

Page 113 has five possibilities listed. They weren't the only five, but they are five possible options that could be considered. Now, in addition to the column under Options for Cutting, there is some very, very brief comment as to what are the implications to the forest as a result if I practised that option.

If we go through these one by one, the first one very simplistically says: We will start cutting on our new rotation age. In the first year I will cut the 60-year-olds; the second year I will cut what now are the 60s but were the 59-year-olds; in the third year I will cut what were the 58s but are now 60-year-olds because they have grown.

So the first option says: I will start now with that part of the forest at rotation age and I will continue to cut annually the 60-year-olds and I will ignore the 61 to 80-year-olds. I will end up, in theory, if everything else worked out, with a normal forest of 60-year rotation, but it will take me 60 years to get it. I potentially waste, don't use, 25 per cent of forest.

Q. Just to highlight, all of these options for cutting implications are when you are

starting with a normal forest; is that correct?

A. We are -- for all of these on page 113, we are all starting with this picture in all of these options. We are taking this situation, a normal 80-year-old forest, I have got it, thank you and then somebody changes the game on me to 60 years. What do I do. All these five options relate to this situation.

The second option that's listed on here on page 113, like the first option, says: Hey, I will cut the rotation age block, the 60-year-olds, the next year I will cut the one that was 59 that is now 60 years, et cetera. The same sort of idea as the first option, but I won't waste the 61 to 80s, I will cut all the 61 to 80 year in one year.

What happens? If I do that, I am going to have an abnormal future forest. I have got this surge when I cut a very large area in any one year, I potentialy flood the market and I end up with a large regeneration level.

The third option: Again, I will cut blocks at rotation age 60, 59, 58 but now I will be a little bit pragmatic, I will spread that overmature chunk of the forest over several years, that being specific, how many severals. So I won't liquidate it all in one year, I in fact will spread that excessive

of the mature part of the forest over several.

I still end up with an abnormal future forest, but no sudden spike in age classes, I have more control over the market flow, I didn't flood it, but in the spreading over the several years I have some degree of control as to when I release it, I have some more control over the regeneration that was a matter there back in option two.

One other option: In option 4, instead of starting at the rotation age block, why don't I cut today the older age classes before they die on me, why don't I cut the 80-year-olds, and the next year what were the 79-year-olds now become 80.

So why don't I start at the very oldest age of the forest, even though I know it is not rotation age, but cut it before I lose them. At the same time, in that age class that is moving up to rotation age, I will do some cutting in there too.

So a slight change between three and four; three I cut starting at 60 and spread the very overmature, in four I will cut the oldest but spread the up to rotation age stuff.

Implications: the forest isn't going to be normal, I will cut the old trees before they die. Again, I control the market flow and I control the

regeneration level.

The last of five options: We will cut one 60th, not one 80th from a mix of rotation age and older stands. All the time in the options one to four we were cutting a block of one age group and because the forest was normal with 80-year rotation age block was an 80th. Now, what we have said is: Hey, open the rotation, let's cut at a level equating to the new rotation which is a 60th. So each year we will cut more than the 80th, more than normal, an accelerated rate of cut. What will we end up with in theory. Normal forest in 60 years, an ideal, an increased but controlled even market flow, an increased but regular regeneration flow.

All five are examples of what could be done, all five have their place depending on the circumstances you are in and, obviously, all five can be mixed.

This is an example of the sort of management thought process the forest manager goes through because of the dynamic nature of the process and the forest.

Q. And when you say that is an example of the thought process the manager will go through, are you limiting that comment to the normal forests

described on page 113, or are you referring to the forests as they are actually found in Ontario?

A. The forests as they are found in Ontario.

THE CHAIRMAN: Mr. Freidin, I think the thought process is enough for today.

MR. FREIDIN: A good place to end. I can advise you, Mr. Chairman, I don't think -- sustained yield will take maybe fifteen minutes and we will be into managements unit.

If I look at the transcript - and I am pretty sure we have covered most of that evidence - so I anticipate tomorrow we will be dealing with the forest inventory.

THE CHAIRMAN: Very good. The Board will adjourn until 8:30 tomorrow morning.

---Whereupon the hearing adjourned at 6:15 p.m., to reconvene Tuesday, June 28th, 1988, commencing at 8:30 a.m.

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